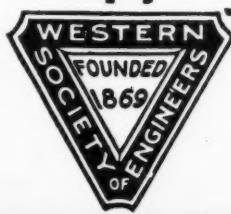
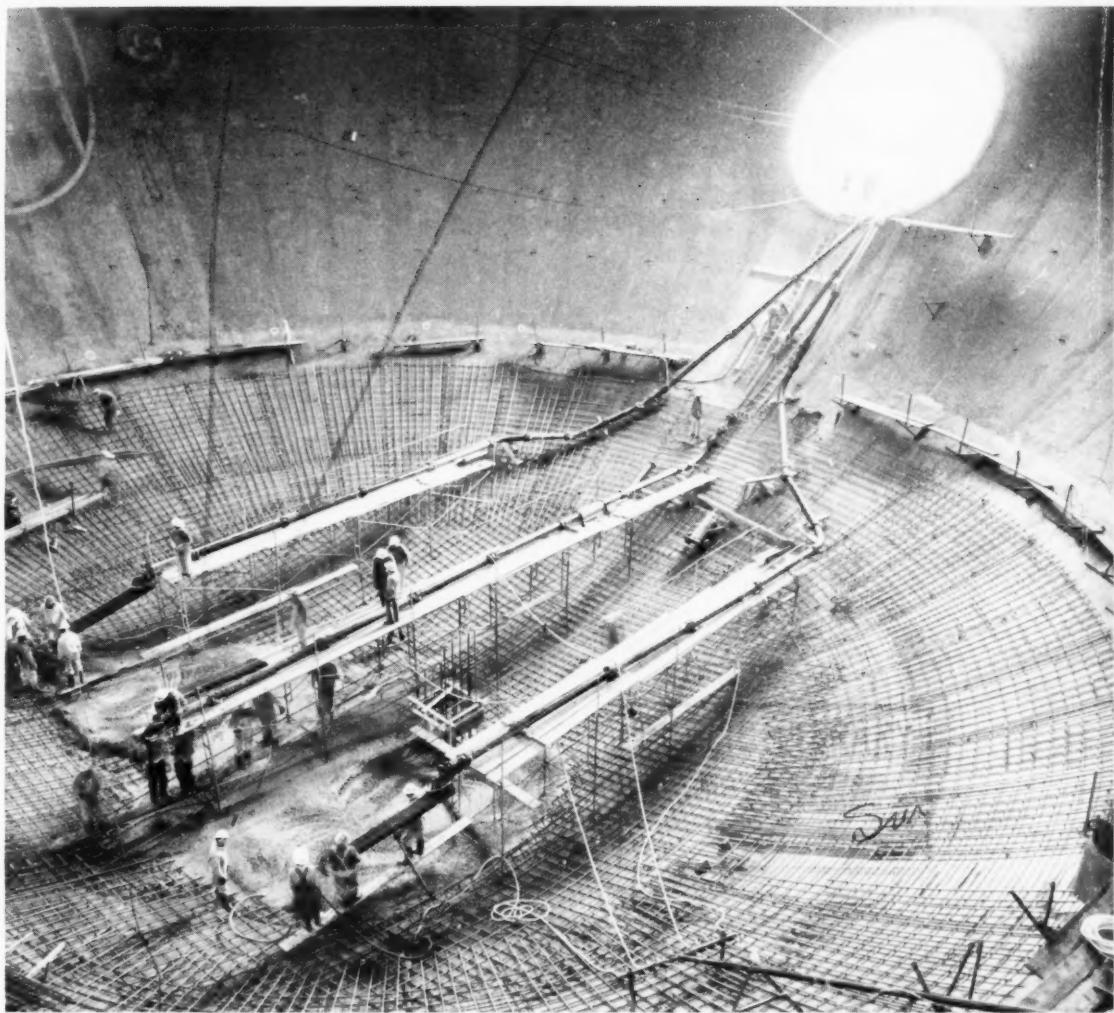


THE JOURNAL OF THE
WESTERN SOCIETY OF ENGINEERS

Midwest Engineer

SERVING THE ENGINEERING PROFESSION



THE TECHNICAL MIND
OF ABRAHAM LINCOLN — PAGE THREE

Vol. 10

APRIL, 1958

No. 11, Part 1

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COVER STORY

Pouring of concrete has begun inside the big 190-foot steel sphere for Commonwealth Edison Company's Dresden Nuclear Power Station. The concrete is pumped to the interior in pipes extending through a hole cut in the side of the sphere.

A total of 22,000 cubic yards of concrete will be required for foundations and shielding for the nuclear reactor assembly which will produce steam to operate the 180,000-kilowatt plant now under construction 50 miles southwest of Chicago.

The project is well ahead of the original schedule, which calls for completion late in 1960, according to Willis Gale, Commonwealth chairman. The plant is expected to become the first full-scale, privately-financed nuclear power plant to go into service in the country.



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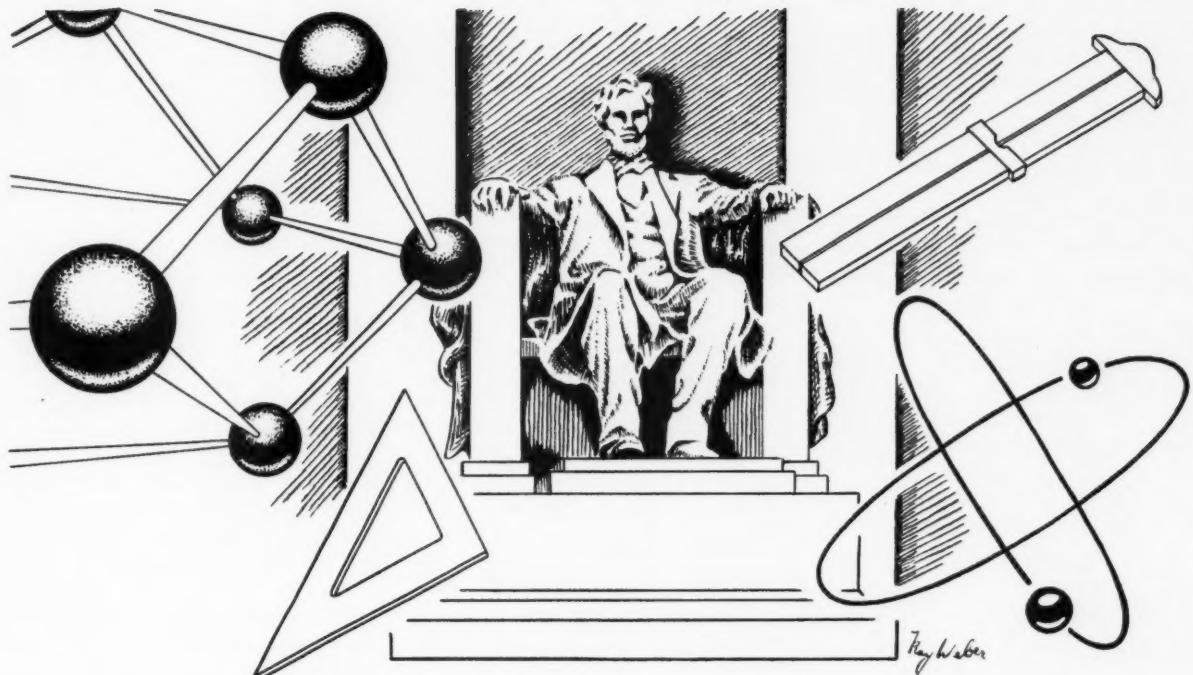
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THE TECHNICAL MIND OF ABRAHAM LINCOLN

By Earl C. Kubicek

Lincoln's personal characteristics, his expressed views on a wide variety of topics—all these things have been subjected to a very close scrutiny by scholars ever since his untimely death. These close, analytical studies have made it possible for us, today, to view Lincoln on a broader scale than ever before and to evaluate a conception of the man we may have formed at an earlier period.

It is truly said that a complete picture of this man, who was so simple and yet so complex in nature, will never be drawn. The poet, the historian, the storyteller all have tried to paint the full-life picture of Abraham Lincoln. His elusiveness, like that of the Mona Lisa, defies all. It is this selfsame elusive quality

that really makes the study of his life and actions a most fascinating study for the scholar.

Shorn of all adornments, Abraham Lincoln is most generally presented to his audience as a lawyer, a politician coming from an environment of great poverty and general ignorance and, with little preparation on his part that would fit him intellectually, assuming the highest office in our land: that of the presidency. He is generally portrayed as being untutored and yet possessed of a mind seemingly able to comprehend, and solve, the most complex of problems. It should be stated, in all truth, that Lincoln in his autobiography prepared for John Locke Scripps lent color to this

misconception for he indicated that in the aggregate, his total schooling of a formal nature was less than a year. This was the truth. He was never inside a college or academy, as a young man. It should be remembered, however, that he regretted this lack of formalized education and did what he could to supply the want.

Following Lincoln's lead in this picture of his education, all of his early biographers, with an occasional slip, rang all the charges of his lack of opportunity before going to Illinois.

The truth is that he early matriculated in the university of nature and experience. He may have seemed uncouth by the standards of the more cultivated

sections of the country, at the time of his arrival in New Salem, but his hands and mind were trained and ready to take advantage of every opportunity that presented itself.

The vast majority of the voters, of Lincoln's day, were unlettered and they felt flattered to believe that an uneducated man might attain distinction. Lincoln was honest but it is doing a great dis-service to the man to believe that he was politically innocent.

He knew that in order to accomplish his purposes—election to office—he must convince his auditors that he was one of them. Sentiment is sometimes mightier than the sword. Not so honest as Henry Clay, Lincoln wanted to be honest as well as be president. A truthful understatement could help the cause.

Lincoln's "College"

In the days of Lincoln's youthful residence in Indiana, we know that many families took pride in sending at least one of their children out of the state to be educated. The textbooks of these young people were brought back home and passed from hand to hand. Lincoln's youthful associates attended six institutions of higher learning in three states. We know that Lincoln had some access to, and diligently studied, textbooks used in various academies, seminaries, and colleges of the day. This was, in a sense, his "Log Cabin College."

It is not our intention to attempt to portray Abraham Lincoln by attempting to understand all of his complex nature. To do so, as some of his biographers have found out to their consternation, is to invite disaster. One phase of his career is, I believe, too little understood and I refer to his affiliation with certain phases of engineering.

We speak of Lincoln as an "engineer" because of his accomplishments as a riverman, as a surveyor and, in later life, as a consultant in legal cases basically resting upon engineering principles. The successful prosecution of these cases required a "technical mind" as well as a legal one. Lincoln had both. If James Joyce can be referred to as an "engineer" in writing style, we certainly feel that we can speak of Abraham Lincoln as an "engineer" or with a "technical mind" through his actual practice of the profession in the field.

An ample supply of pure, fresh water was a prime necessity to the early American pioneer. It was such a supply and source that led Tom Lincoln to establish his family upon the Spring Rock Farm, near the present town of Hodgenville, Kentucky, in the year of 1808. It was on this farm that a son was born to Nancy and Thomas Lincoln on February 12, 1809, and they named him Abraham after his grandfather.

The farming location, chosen by Tom Lincoln, was at one and the same time an asset and a detriment for it lured the unwary with a promise of things never to be fulfilled. Three years' residence on the farm convinced Tom Lincoln of the futility of cultivation here and he removed his little family to another location not too distant on Knob Creek, eight miles from Hodgenville on the main highway between Nashville and Louisville. It was at the Knob Creek Farm that Lincoln had one of his first remembered associations with water as an element. It was almost disastrous, if we are to believe the reminiscences of his boyhood playmate, Austin Gollaher, as given in the afternoon of Gollaher's life. Gollaher claimed to have saved young Abe from drowning in the creek during one of their play periods.

In the Fall of 1816, young Abraham and his sister, Sarah, watched their father build, float, and load a flatboat

with their worldly possessions and then float off down Knob Creek to Salt River whence he would proceed, ultimately, to the Ohio River. His destination, Indiana. Conflicting land surveys in Kentucky give rise to many lawsuits. Tom had his share and, discouraged, he came to look toward the new state of "Indianny" and its rich, black corn-land.

Ultimately staking out a claim on a quarter section of land in what is now Spencer County, Lincoln located his little family on the Little Pigeon Creek. The second autumn, after their arrival at their Indiana Home, the wife and mother, Nancy, died of a disease known to the settlers as the "milk sickness." A year later Tom returned to Kentucky, proposed, was accepted and married Sarah Johnson of Elizabethtown who was then a widow with three children of her own. Tom brought his new brood back to the Indiana home. Sarah proved to be competent, kind, and a comforting mother and wife. She, although illiterate herself, encouraged young Lincoln in his studies.

In Kentucky and Indiana young Abe attended five sessions of school covering a period of some two months. It was customary in country schools of the time to let the students advance as rapidly as possible and with this kind of encouragement it would have been entirely possible for an individual, pos-

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sessed of such a mind as Lincoln's, to make as much progress in a couple of months as the average student could make in a year.

As a sixteen-year-old Lincoln worked on the farm of a neighbor, James Taylor, doing, in addition to his farm chores, service as an operator of Taylor's Ferry on the Ohio River located at the mouth of Anderson's Creek.

Down to New Orleans

Operations as a ferryman proved to be so profitable that Lincoln re-established himself a mile and one-half down the river at Bate's Landing and was soon in business sculling his passengers from the landing to the steamboat operating on the broad Ohio. He rapidly learned of the outside world through these contacts. James Gentry, one of the wealthiest of the pioneer settlers in the community around Rockport, Indiana, decided to expand his market for farm produce. He planned to send a flatboat to New Orleans with a stock of goods for sale. In charge of the boat and his stock he placed his son, Allen. In charge of Allen he put young Abraham.

The ensuing thousand mile trip down the Ohio and Mississippi Rivers was a great educational experience to young Lincoln, not only as a navigator, but in the broadest cultural and political senses.

Stories of the new land opening up along the Sangamon in Illinois, "The Land of Plenty to Eat" as the Indians knew it, caused Thomas Lincoln, in the Fall of 1829, to move again. On February 15, 1830, in a wagon built by Abraham and his father, the Lincoln family started on their trek to a new location near Decatur, Illinois, and their relative, John Hanks who had preceded them. Although Lincoln was now of age, and responsible according to law only to himself, he stayed with his family on this move and helped in the relocation of the family.

Denton Offutt came into their community the following Fall. Offutt was a hard-drinker, a hustler, a man shrewd of wit and glib of tongue. He told Lincoln and Lincoln's step-brother, John Johnson, and John Hanks of a plan he conceived to send goods down to New Orleans, and he engaged the trio to meet him in the Spring near the village of Springfield.

This journey, made in April, 1831, provided Lincoln with the opportunity to become acquainted with the fast-growing little village of New Salem, Illinois. Rounding the curve in the river, at the foot of the village while enroute to New Orleans, Offutt's craft stuck fast on the Rutledge-Cameron Mill.

Lincoln saved the day for himself and his associates by boring a hole in the

end of the flatboat, then hanging suspended over the dam, thereby letting the water in the craft drain out and allowing it to drop over the dam. The cargo, which had previously been unloaded, was re-loaded and the journey was continued. Here was native ingenuity put to practical use—a technical mind asserting itself.

Lincoln remained in New Orleans, upon their arrival, for about a month, absorbing the spirit of a community the like of which he had never known before. He earned his return passage by acting as a fireman on the steamboats. His return destination this time was the little village of New Salem where he had been promised a position as storekeeper by Offutt who planned to establish a store in the village.

Living in New Salem

The chance selection of New Salem was to prove fortunate for young Lincoln. It was to be his home for the next six years—formative years in his lifetime.

The Rutledge-Cameron Mill had made New Salem, for a short time, the principal trading point for a large section of the surrounding countryside. The location of the village, on the river, gave rise to high hopes on the part of residents that it would ultimately, become the metropolis of the region.

These apparent advantages to living here attracted some very superior people from widely separated points of origin. The population of the village of New Salem, at its prime, equaled that of the village of Chicago. The mail coach, making its weekly run from Havana to Springfield, passed through and stopped in New Salem.

As usual, however, Denton Offutt's talk was more bountiful than his cash and Lincoln found, upon his return to the village, that the store was not yet ready. In the interim he took on another job of piloting a family, removing from Illinois to Texas, down the Illinois River to Beardstown, Illinois.

One of Lincoln's new friends in his new home, and one of the most important from the point of view of his mind's cultivation, was the village schoolmaster, Mentor Graham, a born instructor and a conscientious student

(Continued on Page 12)

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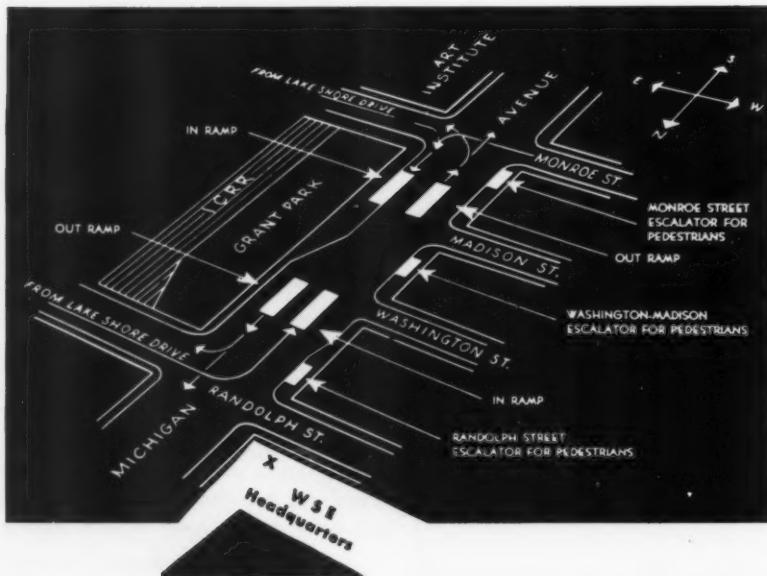
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Below: map showing Park Department Underground Garage



Interior view of Underground Garage

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Metallurgists Report on Russia

American metallurgists who visited Russian plants, research centers, and educational institutions were greatly impressed with what they saw. They comment frankly on those areas where the Soviets are ahead and other areas where they are not in the March, 1958, issue of the *Journal of Metals*, official monthly magazine of The Metallurgical Society of The American Institute of Mining, Metallurgical, and Petroleum Engineers.

Their articles, constituting virtually the entire issue, emphasize the aggressiveness with which the Russians have gone forward in metallurgy, in the specialized technical training provided in their institutes at the sacrifice of the humanities; in the studied coordination of training, research, and industry; in the extensive concentration and distribution of foreign technological literature; and in the extraordinary manpower assignment to the field of metallurgical research and production, even though safety measures may be lacking in the latter phase.

As recounted in the magazine, the visits by the Americans followed the attendance of Professor A. H. Samarin, of the Baikov Institute of Metallurgy of the Academy of Sciences of the USSR, at a New York University titanium conference in 1956. Thereafter, Professor Samarin and another Russian savant presented papers at a New York University vacuum metallurgy conference. Thus developed a program of exchanges of visits in 1957, organized by New York University and the Moscow Steel Institute.

While the American visitors to Russia found a degree of reticence on the part of their hosts in certain matters, they admitted that similar inquiries by the Soviet delegation at American establishments probably would have encountered a like reluctance.

In its editorial, "The End of Illusion," based on the articles, the *Journal of Metals* acknowledges that in this country a start has been made toward translating Russian engineering literature, emphasizing that prior to that effort "we stood in almost complete ignorance of technical developments in the USSR," while Russia kept abreast of the rest of the world's technological literature.

The translating activities now being developed in this country and the visits to the Soviet Union are factors, says the editorial, in keeping our picture completely black. It urges further:

"Let us increase the translation of Russian technical literature and augment the visits of American engineers to the USSR and increase our reading knowledge of foreign languages. Not only will these means keep us abreast of the scientific developments on the opposite side of the Iron Curtain but perhaps they may also tend to lessen the distrust which divides us today."

Dr. John P. Nielsen, chairman of the New York University Department of Metallurgy, was impressed with the firm guardedness of the Russians when the Americans suggested deviation from the set itinerary and when the hosts fended off certain questions.

"All in all, the itinerary was not too bad, as it included a number of good metallurgical laboratories," Prof. Nielsen conceded. "In speaking with research people we usually found the universal desire to talk and exchange ideas about the research they were doing. Certain questions, however, seemed to find no answers."

A special study of Soviet technical education was made by Dr. John Chipman and Dr. N. J. Grant, chairman and professor, the Department of Metallurgy, respectively, at Massachusetts Institute of Technology. Dr. Chipman is vice-president and president-elect of The Metallurgical Society.

Their report emphasized that in metallurgical training the Russians have developed a high degree of specialization plus a requirement of practical training in industry. "The general program is tailored to the needs of Russian industry," they wrote. "Each student is well trained for a specific kind of job in a specific industry. The product seems to be satisfactory to industry. It appears that a diploma in metallurgical engineering is a *sine qua non* for industrial advancement. To a considerable degree, educational breadth is sacrificed to specialized training. This is a sacrifice which cannot be recommended to American students.

"In numbers, the Russians are far ahead of us in the training of metallur-

gists. More emphasis should be given to metallurgy in American schools and renewed efforts must be made to increase the enrollment of superior students. Laboratory equipment for instruction in Russian schools is superior to that in our own. This is true in respect to the quantity of good equipment available and the diversity and advanced nature of the laboratory experiments for which equipment is provided."

Pointing out that 85 per cent of the metallurgical students receive stipends, which may be rescinded for poor discipline or inadequate marks, David Swan, director of research, the Linde Company, a Division of Union Carbide Corporation, went on to note that "the school record is very important in selection of a job upon graduation." An article by Dr. Walter R. Hibbard, Jr., manager of alloy studies at the research laboratory, General Electric Company, Schenectady, N.Y., and president of The Metallurgical Society of AIME, observed that the students study free of charge, plus a stipend. At the Moscow Steel Institute it was found that the stipend was

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said to exceed the average Russian income.

"The size of the educational effort in metallurgy is impressive," reported Dr. Hibbard. His article stated the Russians graduate four or five times the number in the United States. With more metallurgists available than required by jobs, "they may put a large number on a given job, possibly without regard for economics but solely with regard to the effects on production," Dr. Hibbard explained.

Professor Morris Cohen, of M.I.T., was struck with the virtual neglect of the humanities in higher education for scientists and engineers, finding that reliance in this field seemed to be placed on the secondary schools. An article by Dr. John H. Hollomon, manager, metallurgy and ceramic research, General Electric Company, and co-authored by Dr. Hibbard, emphasized the trained ability of Soviet scientists to read English and the highly developed Soviet program of translating myriad foreign technical publications and making their contents available to their own scientists and engineers, as compared with the general laxity in this respect in the United States. The *Journal of Metals* editorial stated that the American visitors to research centers "were astounded to find the extraordinary knowledge of American technical literature the Soviets possess" and quoted Dr. Hibbard as reporting, "All Russian scientists with whom I talked had a good translation knowledge of English and their detailed familiarity with American literature was phenomenal."

In summary, the Hollomon-Hibbard article said: "The size, intensity and concentration of the Soviet metallurgical areas of science and development is impressive. It is important that American metallurgists become familiar with the Russian scientific and technological effort in the field of metallurgy, both through their literature and its translation and by personal contacts, where possible. We believe the Soviet metallurgical effort will continue to be large, concentrated, extensively supported and directed toward specific national problems or the phenomena on which they depend."

An article by Leslie Seigle, of Sylvania Electric Products and adjunct professor of metallurgy at New York University, observed that "the socializa-

tion of technology permits the integration of scientific effort on a vast scale, and attention of a visitor from a free country is attracted by examples of co-ordination in schools, research institutes, and industry."

Claus G. Goetzel, senior research scientist, New York University Department of Metallurgical Engineering, noted that "research and development in powder metallurgy in the USSR seems both advanced and intense, but no really spectacular results were noticed," with the possible exception of titanium, beryllium, and ductile tungsten production aspects. "However," cautioned the writer, "further progress in these areas can be expected and bears careful watching."

Having been to four key Russian steel plants, Professor Nicholas J. Grant and Professor John Chipman of M.I.T., felt that "the Soviets have been doing extremely well in the application of the principles of steelmaking, in the installation of modern equipment and in the utilization of manpower for production purposes."

An article by Mr. Swan on alloy steel in the Ukraine Dnieperprestoye works, an electric-furnace operation employing 10,000 persons, revealed "the complete absence of even elementary safety precautions."

"Goggles are worn rarely, even when grinding or chipping," reported Mr. Swan. "When I asked if the men wore



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safety shoes, the superiors did not appear to know what safety shoes were."

The magazine contains, also, an article by Dr. I. I. Kornilov, professor of metallurgy at the Baikov Metallurgical Institute, on the successful Russian use of high-temperature centrifugal testing apparatus and an article by Professor A. M. Samarin on Soviet vacuum treatment of steel.

Wash and Wear

An Australian research organization has developed a finish for woolens that puts these goods in the wash-and-wear category, *Textile World* reports. Woolen garments treated by the process can be washed in soap and water or worn in the rain without losing creases.

Case Opens Computing Center

Outstanding leaders in industry and research hailed the dedication of the Case Institute of Technology Computing Center in Cleveland, Ohio at special ceremonies on Apr. 12.

Speaking at the dedication of the \$2,500,000 center, one of the largest and best equipped in the nation, were Marcell Rand, executive vice-president of Remington Rand, J. J. Bricker, vice-president of International Business Machines, Dr. Englehardt Eckhardt, assistant director, National Science Foundation, John E. Kusik, vice-president of the Chesapeake and Ohio Railway, Dr. T. Keith Glennan, president of Case,

and Dr. Raymond J. Nelson, director of the Computing Center.

Outlining the purposes of the Center which contains both a Univac I and an IBM 650, Dr. Nelson said, "The power of the Univac and IBM 650 may be characterized by the fact that the combined machines are capable of 40 million arithmetical operations in an eight hour day. The center is primarily a laboratory for the study of computers and their use. This research is to be conducted with a view toward solution of practical computational problems and yet is necessarily concerned with fundamental research in numerical analysis, logical design, automatic programming and computer theory.

"Another purpose of the Center is education in computers at both the graduate and undergraduate levels. This educational work includes machine operation and programming as well as formal course work in the same areas as are indicated for research above.

"In addition, the Center conducts non-credit short courses for its own faculty and industrial concerns in computer operation.

"Still another aim," Dr. Nelson added, "is to perform a computational service for Case research facilities, for neighboring universities and for industry. The Center has already had wide experience in dealing with problems ranging from theoretical physics and medical research, to the calculation of life insurance tables."

The \$1,500,000 Univac I in the Center is a gift to Case from Remington Rand Division, Sperry Rand Corporation. In making the presentation, Marcell Rand said, "It is a privilege for me to be here on this occasion, and it is with both pride and humility that I present to Case Institute of Technology, on behalf of Remington Rand, this Univac System, so that it may become part of Case's great tradition, and — we feel certain — its even greater future.

"The challenge here at Case, as at other universities, is formidable: to integrate computers with procedures of industrial management, human organization and the sciences; to explore new ideas in computer usefulness; and to prepare men and women with the special

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talents required to put the computer to work. A challenge indeed, but one which is in excellent hands.

"This installation which is being dedicated reaffirms Case Institute's progressive outlook. It helps insure that the highly trained technicians who will be needed in tomorrow's world will be available. It will help carry forward the frontiers of knowledge in the best traditions of our country.

"Finally, it permits those of us at Remington Rand to do our small share in furthering both the pursuit of knowledge and the education of young people—'integrated' activities which are, in fact, inseparable."

In accepting the gift of the Univac for Case, President Glennan said, "It is with genuine pleasure that I accept this generous gift. It is our hope to make it a useful tool in the progress of education and research at Case, and of service to all of Northeastern Ohio.

"With the completion of our Computing Center, we look forward to entering one of the still largely unexplored

frontier areas of science. As an educator, the fascinating aspect of this entire computing problem lies in its potentialities and in the opportunity to be able to provide some of the professionally trained manpower that will be required to explore these potentialities."

J. J. Bricker of IBM, which is renting the 650 computer to Case at academic rates, spoke of his firm's participation in the center. "The advent of the high speed digital computer presents a unique opportunity for increasing the effectiveness of the people engaged in scientific research. The engineer or scientist may see the results of his efforts amplified many times by the use of these tools. It is becoming increasingly clear that there are many new areas of research which would not be possible without these tools. And it is especially true that industry and government must look to the universities for leadership in this phase of the effort. The university is traditionally the place in which new ideas originate, and where research of a fundamental character can be carried out.

"We feel that the establishment of the computing centers and active programs of teaching and research which make use of these facilities is a positive step towards alleviating the critical shortage of technical people. The program which you have developed at Case Institute is an outstanding example of what a college can do when it faces up to this challenge. The tradition of Case Institute lends itself particularly well to the furtherance of these goals and we in IBM as part of our educational contribution program are especially pleased to have been able to assist in its establishment.

"I want to compliment all of you at Case but especially Dr. Glennan for your vision and for your determination in achieving this significant step."

John E. Kusik, of the Chesapeake and Ohio Railway, represented industry's interest in the opportunities offered by the center. He said, "A university must play an important part in teaching existing computer techniques. It can be foreseen today that the demand for appropriately trained personnel will proceed at an accelerating pace. There will continue to be a shortage of trained people. This includes people who can design, supervise construction and oper-

ation of computers and also people who can speak the computer language and prepare written instructions for the computer, to be fed into it through various kinds of tapes upon which they have been recorded.

"Additionally, let us remember that we are still in the very early stages of these computer systems—at the very beginning of a revolution. Thus, it should be plain that a forward-looking and progressive institution like Case Institute cannot afford to delay getting into it on a large-scale basis.

"I think that it is a great tribute to the leaders of this institution that they have taken this forward-looking step to construct their own computer center. On the other hand, we, in industry, have an obligation of encouraging and financially supporting such efforts."

Dr. Eckhardt, of the National Science Foundation, stressed the importance of computers in the nation's science needs.

More than 100 prominent industrial and educational leaders attended the dedication luncheon, including Lt. General Leslie R. Groves (retired) vice-president of Remington Rand. Following the luncheon and a special preview for the luncheon guests, 1,000 persons inspected the Computing Center during an open house later in the afternoon.

Off-the-Road Truck

An off-the-road truck that can be steered three ways has been developed, reports *Product Engineering*. The front wheels can be turned alone; the front and rear wheels can rotate in opposite directions to turn truck within its length, and both sets of wheels can turn together to move the truck sideways. There are 24 wheels to the truck, and they all drive and brake.

Electronic Blessing

Electronic principles that guide missiles may soon be applied to artificial limbs and braces, reports *Electronics*. An electronic firm is attempting to find a method of electronically releasing and controlling, at the will of the wearer, the energy required to operate an artificial limb or brace. If the company is successful, polio patients especially will be benefited.

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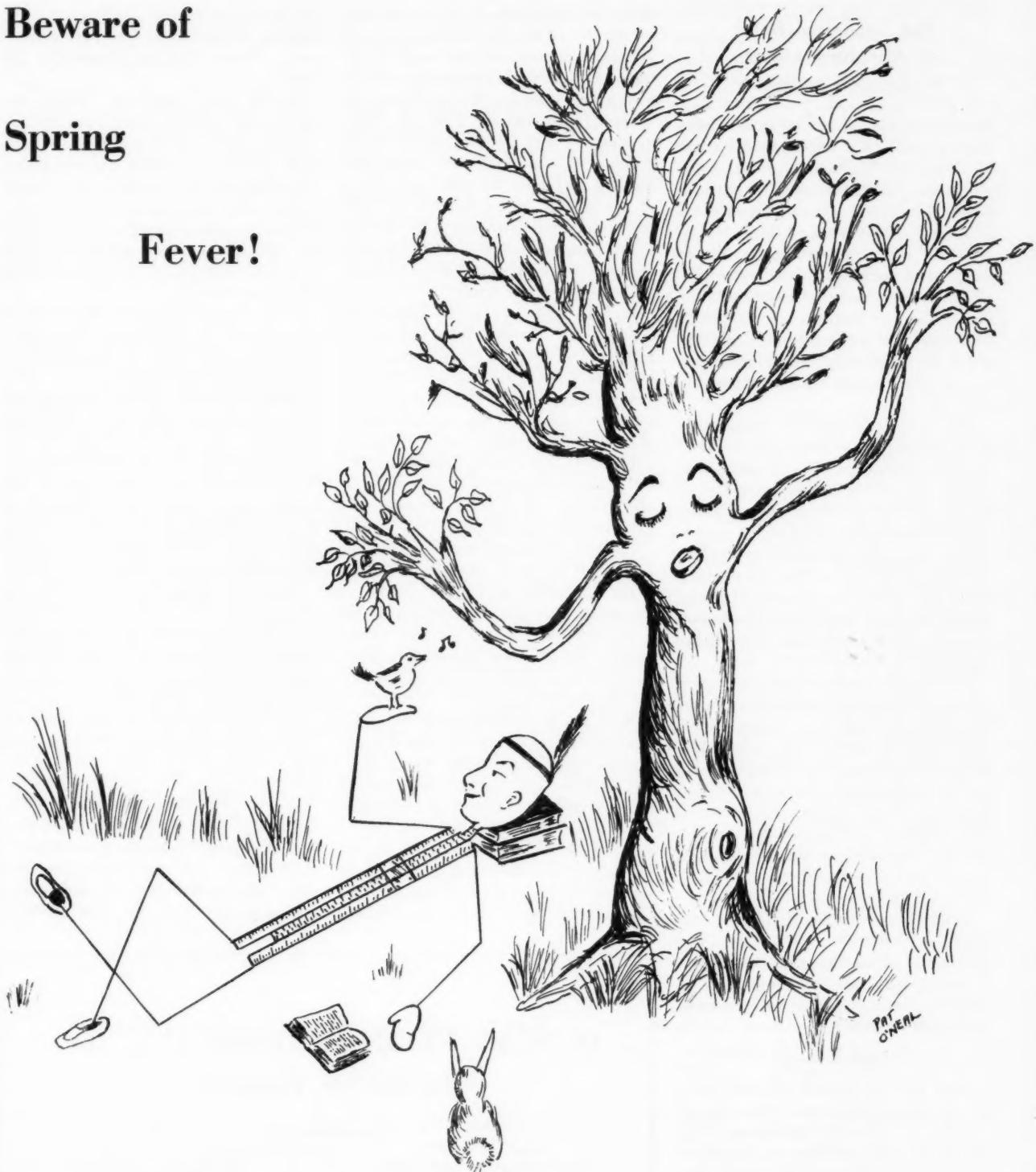


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The Technical Mind of Abraham Lincoln

(Continued from Page 5)

himself. It was at his suggestion that Lincoln undertook the organized study of Grammar, Mathematics, Chemistry, Astronomy, and Philosophy. Other professional men both in the community and in nearby points, extended themselves to help this young man anxious to advance his fund of learning. This characteristic of Lincoln's—levying tribute on the knowledge and learning of those with whom he came in contact, absorbing that which he found most useful in advancing his own learning—is a most interesting one.

The constant struggle of inland communities for market outlets, communications, and cheap methods of transportation to the outside world was typical of the period and the village of New Salem was no exception to the rule.

The village was electrified, in the Fall of 1832, with the news that the steamer, *Talisman* would leave Cincinnati, Ohio, and make New Salem its destination bringing into the communities along the way goods from the east.

The trip was made and the officers and crew of the steamer were royally entertained in the village—its destination. Word passing through the village that the lady accompanying the captain was not his wife caused some consternation but really did not hamper the festivities. They were so prolonged that rapidly falling water levels warned that the return trip must be made promptly if at all.

Chief Pilot Abraham Lincoln sat quietly by while the ship's officers and the owners of the dam argued the point concerned with tearing down part of the dam to allow safe passage of the vessel on its return trip.

Into Politics

Days and months passed quietly for young Lincoln in his new home. He accumulated debts as a storekeeper, served first as an officer and then as an enlisted man in the short-lived Black Hawk War, was appointed the village postmaster, and then stood as a candidate in the race for the Illinois State Legislature.

In campaigning he called upon his river experience saying, "From my pe-

culiar circumstances, it is probable that for the last 12 months I have given more particular attention to the stages of the water in this river (referring to the Sangamon) than any other person in the county. In the month of March, 1831, in company with others, I conceived the building of a flatboat on the Sangamon, finished and took her into the course of the stream. Since that time I have been concerned with the mill at New Salem. These circumstances are sufficient evidence that I have not been inattentive to the stages of the water."

Lincoln had one great possession: friends. One of these, John Calhoun, a Jackson Democrat at a time when Lincoln was a Whig and surveyor of Sangamon County, found himself in need of a deputy because of the constant influx of immigrant families into the Illinois territory. Calhoun asked Lincoln to take the position although it would be necessary for Lincoln to learn surveying before he could actually work.

Lincoln has laconically expressed his version of the story saying: "The surveyor of Sangamon County offered to depute to Abraham that portion of his work which was within his part of the county. He accepted, procured a compass, a chain, studied *Flint and Gibson* a little, and went at it."

With a copy of *The Theory and Practices of Surveying*, by Robert Gibson, Lincoln hunted up his old friend, Mentor Graham, and together they settled down to make a surveyor of Lincoln in the shortest possible time.

From decimal fractions the book ran into logarithms, the use of mathematical instruments, trigonometry, operating the chain, surveying by intersections, chang-

ing the scale of maps, leveling, and the General Method as well as the Pennsylvania Method for the Measurement of Areas.

Lincoln was fagged out. Friends testified that sunken cheeks, and bleary, red eyes gave him the appearance of a hard drinker on a spree that had lasted two or three weeks continuously. In six weeks' time, however, Lincoln had mastered his books, the chain and the three horizons and Calhoun put him to work as a deputy surveyor in the north end of Sangamon County.

It is a matter of record that Lincoln did his work so well and so thoroughly that no survey, made by him, has ever been the subject of litigation.

When Calhoun's term of office as the County Surveyor expired in 1835, his successor, Thomas N. Neale, re-appointed Lincoln as one of his deputies. Surveys made by Lincoln include the Illinois towns of Petersburg, Bath, New Boston, Albany and Huron, as well as three roads, three school sections, and many pieces of farm land.

When the Illinois Legislature met in Vandalia, in 1834, one of its members was 25-year-old Abraham Lincoln who was for such things as internal improvements to the tune of a bill for \$100,000 to improve the Rock River for navigation and another bill for \$4,000,000 to complete the Illinois and Michigan Canal.

Visiting Chicago

In July, 1847, Lincoln made his first trip to Chicago in connection with the great Rivers and Harbors Convention being held in that city. He was the congressman-elect from the Seventh Con-

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gressional District of Illinois although his term of office would not begin until December of that year.

His active interest in internal improvements, gained through actual working knowledge, made him a logical choice to be a delegate to the convention. He acquitted himself so well at this meeting that he received favorable notice from none other than the influential Horace Greeley, editor of the New York *Tribune*, who was at Chicago covering the convention for his paper.

On to Washington

As a freshman congressman in Washington, Lincoln could take but little part in activities of any consequence although he still maintained his active interest in internal affairs and used well the facilities of the Congressional Library carrying his books back and forth tied in his bandana over his shoulder.

After his first session Lincoln returned to Illinois by way of Niagara Falls where he speculated upon the possibilities of using the power generated by the falls for commercial use. His steamer met a common fate—it was stranded upon a sand bar near Detroit. The captain of the craft freed it by forcing planks, boxes, and barrels under it. Several of Lincoln's suggestions, relative to the operations, were accepted. We may believe that they were more practical than would usually be offered by the spectators. An outgrowth of this experience was his developing plans and causing to be built a model now in the Smithsonian Museum in Washington, D. C. His patent application concerned with a method of freeing vessels caught on sandbars, was made on March 10, 1849, but there is

no evidence that the idea was ever used by anyone.

Lincoln's Practice

Lincoln's law practice was a general one although patent cases, with their usual problems in mechanics and engineering, always had a fascination for him. As counsel for the defendant in the case of *Parker vs Hoyt*, an action taken for the infringement of a patent water wheel which came to trial in Chicago in 1848, Lincoln, using his earlier experiences as an attendant at a sawmill near New Salem, explained to his jury the action of water on the wheel in such a clear and comprehensive manner that a verdict was returned in his client's favor.

In the more famous *Effie Afton Case*, Lincoln represented the defendants, the Peoria Bridge Company, who were being sued for damages incurred in an accident between a canal boat and the bridge in the channel of the Illinois River. Here his knowledge of navigation as well as his analytical turn of mind stood him in good stead.

The *Horological Cradle Case* involved patent rights to a device designed to relieve mothers of the necessity of rocking a cradle continuously. Lincoln took full charge of the exhibits and scientific drawings. A verdict was finally rendered in favor of Lincoln's clients. Lincoln said of the device, "The thing is like some glib talkers I know of; when it gets going, it don't know when to stop."

He was an interested reader of a set of books bought by his law partner, William H. Herndon, called, *Well's Annual of Scientific Discovery*. He told Herndon, "I sometimes make experi-

ments and have thoughts about the physical world that I do not know to be true or false. I may, by these books, correct my errors and save time and expense."

He was one of the legal counsel engaged by John H. Manny in his suit against Cyrus McCormick. The suit arose out of prior rights in their reapers. Through the machinations of Edwin M. Stanton, later to be taken by Lincoln into his cabinet when he was president, Lincoln was forced out of active participation in the case although remaining as a consultant due to his technical knowledge.

Other legal cases, involving technical appreciation, knew Lincoln's participation in the days following.

Leisure Study

Knowledge, for Lincoln, was a living entity always available. His companions, on the old Eighth Judicial Circuit in Illinois, are our authority for the picture of Lincoln studying the books of Euclid during spare moments away from purely legal problems. As president, Lincoln continued his interest in things technical in nature. His connections with the Navy Department, during the Civil War, in the matter of armament is well known. He was most interested in the development of the *Monitor*, both for its political as well as its scientific impact.

He was deeply interested in the use of balloons during the war for observation work of the Army and was one of the first persons in the world to receive a telegraphic message sent earthward from a captive balloon. He pressed for consideration, by Congress, of the international telegraphic service across the Atlantic as well as coastwise cable service.

Lincoln did not consider himself to be a military expert although, through circumstances, he was forced to make himself thoroughly familiar with military science. His withdrawals, from the Library of Congress, of military textbooks shows the depth of his interest gained, in a rudimentary way, in the Black Hawk War.

Abraham Lincoln is many things to many men. His many-faceted character lends itself to a great variety of interpretations. His general frame of mind was not, in any sense, that of a theorist. His mind was firmly entrenched in practical matters with more than a slight

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leaning to the technical. If for this, and no other reason, we could well speak of "The Technical Mind of Abraham Lincoln".

* * *

Earl C. Kubicek, director of Alumni Relations and Placement of the Illinois Institute of Technology, presented the article, above, before a Noon Luncheon Meeting of the Western Society of Engineers on Feb. 12, 1958 at the Society's Headquarters in Chicago.

ASME Members To Meet in Detroit

A program designed to keep them up to date technologically is expected to attract more than 2000 engineers to Detroit June 15-19. The event is the Semi-Annual Meeting of The American Society of Mechanical Engineers.

According to the program announced by the society, four days of intensive technical sessions will include topics in the power, safety, design, fuels, rubber and plastics, heat, production and solar energy fields.

Attendees will consider such individual items as Russian and American systems of automation, and work on commercial atomic energy power plants.

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Ben Moreell Gets Washington Award

The engineering profession's highest honor, the Washington Award, was presented to Mr. Ben Moreell at the Drake Hotel in Chicago, on May 9, 1958.

The Washington Award is an honor conferred upon an engineer by fellow-engineers for accomplishments which pre-eminently promote the happiness, comfort and well-being of humanity. The Award is administered by Western Society of Engineers on recommendation of a commission representing the American Society of Civil Engineers, The American Institute of Electrical Engineers, American Institute of Mining, Metallurgical and Petroleum Engineers, American Society of Mechanical Engineers, and Western Society of Engineers.

Moreell, chairman of the board of Jones & Laughlin Steel Corporation, was recognized for "distinguished service as a skilled engineer, outstanding naval officer, industrialist, and Hoover Commission associate." The Washington Award is the highest engineering award given in the United States.

During his nearly 30 years of naval service, Moreell rose from the ranks to become the only non-Annapolis graduate to attain the permanent rank of admiral. During World War II, Admiral Moreell conceived and brought into being the organization which, though military in nature, devoted its primary energies to construction and engineering problems peculiar to war time. His brainchild became known as the "Sea Bees."

During the course of the war, the Sea Bees were responsible for the building and maintaining of more than 900 bases and stations throughout the world.

When, after the war, he retired from active service in 1946, Admiral Moreell channeled his energies into directing one of the United States' major industrial organizations, Jones & Laughlin Steel Corporation where he launched a \$500,000,000 expansion program. Coupled with the plant construction in the blighted area of Pittsburgh's south side, Moreell saw to it that the company, working with the union and the city government, found homes for over 100 families that had to be moved from the area. Ben Moreell, for his many contributions to that city's welfare and pro-

gress, was chosen "Pittsburgh Man of the Year" for 1951.

Dr. J. T. Rettaliata, Western Society treasurer, president of the Illinois Institute of Technology, and chairman of the Washington Award Commission presided at the Award Dinner. Ormas G. Smith, chief Engineer of Illinois Bell Telephone Company and president of Western Society of Engineers, presented the Washington Award.

Morell presented an address to the assembly, "An Engineer Looks at Engineering Education."

Great Lakes to be Sea of the World

The Great Lakes will become, in effect, one of the "seas of the world" as a result of improvements in the Great Lakes-St. Lawrence system, Maj. Gen. Charles G. Holle, U. S. Army Engineers, said in Chicago on Mar. 27.

Holle, special assistant to the Chief of Engineers, added that the development program holds promise to provide "an impetus to the growth of the Midwest which stretches the limits of the imagination, and will affect every interest, every activity, and every human being in the region."

These predictions were made in an address at a luncheon of the 20th annual American Power Conference in the Hotel Sherman attended by power industry officials, engineers, educators, business and industrial executives, and government officials.

The conference is sponsored by Illinois Institute of Technology in co-operation with a group of colleges and universities and professional societies.

Holle cited numerous benefits he expects to derive from the Great Lakes-St. Lawrence improvement, among them freight savings in grain exports, increased values of midwestern farm land, the pulling power on foreign commerce of Chicago and other lake cities such as Milwaukee, Detroit, Cleveland, and Buffalo, and rapidly rising consumption of electrical power.

In describing the improvement programs carried on by the Corps of Engineers, Holle stressed the importance of the Calumet-Sag channel as the connecting link between the Great Lakes and the Illinois and Mississippi rivers waterway system.

Precipitator Saves Diesel Wear

The use of a newly designed electrostatic precipitator in the air intake of a diesel locomotive engine results in a significant reduction in the wear of engine parts and allows for a longer period of engine operation between overhaul periods, the American Institute of Electrical Engineers and American Society of Mechanical Engineers Railroad Conference was told in Cleveland on Apr. 9.

Pell Kangas and W. C. Kern of the Baltimore & Ohio Railroad, Baltimore, Md. and E. L. Richardson of the Westinghouse Electric Corp., Boston, Mass., reported in a paper presented at the conference that the electrostatic precipitator, "specially designed to fit the limited space in a diesel locomotive", has completed two years' of tests in regular B & O Railroad service.

Other important results of the test period as reported by the three men were: The electrostatic precipitator operated as installed without need for making any major changes; maintenance was not difficult and conformed

to normal practices used in the railroad shop; and parts failures were minor in character and were corrected by shop personnel.

Two basic functions, it was explained, are usually performed by an electrostatic precipitator designed for high efficiency of dirt collection. The first function is the charging of the air-borne dirt particles; the second and electrostatic precipitation of the particles. Dirt particles are charged by passing them through a field of unipolar ions. Precipitation is accomplished by interaction between the charge on the dirt particle and an electrostatic field normal to the direction of air flow.

After the completion of the test period, the three men said, test engine parts were examined visually and found "exceptionally clean" in comparison to parts of a control engine which was equipped with the standard 4 inch type of panel filters.

"For instance," they said, "right groove, oil ring and cylinder liner deposits were considerably less for test

engine than for the control engine. The rate of engine deposits, therefore, seemed to correlate with parts wear. It was generally agreed that the test engine could have continued to operate efficiently well beyond the normal two-year overhaul period based on the wear rates experienced."

The tests also showed that the precipitator collected all airborne particles including oily and carbonaceous components of the railroad atmosphere they said. Dirt deposits "adhered tenaciously" to the surfaces of the collector and ionizer plates and could not be removed by pounding or vibrating the plates.

"This provided a new experience in understanding the nature of airborne dirt associated with the railroad atmosphere," they said.

Another good indication of the air cleaning efficiency of the precipitator was apparent when an inspection of the plenum chamber showed no dirt deposits, it was reported. All interior surfaces of the plenum chamber had not been cleaned during the period of the two-year test, the three men said.

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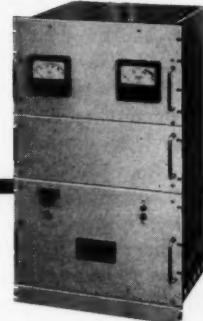
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Because of the limited space available in the diesel locomotive, it was pointed out, air velocities through some of the sections of the ionizer and collector of the precipitator unit was excessive. The progressive reduction in particles collecting efficiency during the first 15 days (of a 30-day charted efficiency period) from 98 per cent to 93 per cent was largely related to these high air velocities. After 30 days the efficiency dropped to about 40 per cent. This necessitated changing out collector cells and ionizer every 15 days in order to maintain a high efficiency.

"... the prime objective of any future (precipitator) design would be to extend the high degree of efficiency obtained during the initial 15-day period to a service period lasting 30 days," the three men concluded.

Elgin Micronics Div. To Occupy New Site

Elgin National Watch Company announces its Micronics division will, on Sept. 1, occupy a new 60,000 square-foot headquarters and combination development-production plant to be leased in the Northwest suburban area of Chicago.

The division specializes in development and custom production of high precision components, chiefly involving guided missiles, automatic aircraft control systems and timing instruments.

The new plant, approximately a \$1,000,000 project, will be built on Illinois State Highway 53 on the southern outskirts of Palatine, Ill., a suburban area 28 miles northwest of Chicago and about 10 minutes from O'Hare International Airport.

Lease negotiations are being conducted by John B. Kilroy, Los Angeles industrial developer and board chairman of Co-ordinated Construction Company of that city. Construction will be handled by Dahl-Stedman Company of Chicago. Architects and engineers are Dunlap-Esgar, Inc., also a Chicago firm.

About 200 new division personnel will be hired in the Northwest suburban area for the new plant, and in addition some 100 employees will be transferred from present division facilities and headquarters at Elgin, Ill.

The new plant will be equipped with special atmospheric controls to accom-

modate precision developmental and production work. Space will be provided for administrative headquarters controlling both the Palatine plant and operations at Micronics facilities in Chatsworth (Los Angeles) Calif.

George W. Fraker is Micronics division general manager and will make his headquarters in the new plant, transferring from Elgin.

The Palatine plant will assume all Micronics work now centered at Elgin, Ill., as well as much of the work now at the company's Lincoln, Neb., plant, which is being closed. Some personnel and projects at Lincoln will be transferred to the West Coast, it was announced.

Shutdown of the Lincoln plant, Shennan said, is part of the company's major plant relocation program aimed at consolidating and strengthening its operations for increased profitability.

Watch production now at Lincoln will be moved to Elgin, where all of the company's timepiece production will be centered. Between 200 and 300 new jobs will thereby be created at Elgin.

Missile work now assigned to the Micronics division includes production of safety and arming mechanisms for the Army's Nike, the Navy's Sidewinder and Sparrow missiles, as well as numerous other weapons. The company is also making highly intricate air data computer assemblies for a large firm serving the jet aircraft industry.

A major benefit of the Micronics moves, Fraker said, is that research, development and production projects of the division will be located much nearer to customers than was possible at Lincoln. He described this as a highly important factor because of the need for close contact in ironing out technical problems.

Useful Disk

A steel disk with a two-inch rubber rim that can be bolted to an automobile wheel if the tire goes flat is reported by *National Petroleum News*. The disk is formed to fit snugly against the wheel. The flat tire remains in place until the driver reaches a service station. The car can ride on the disk for a maximum of 100 miles, at speeds up to 45 miles per hour.

Did You Return Your Clipping?

The 8th Edition of *Who's Who in Engineering* is scheduled for publication at the end of this year. The editors of the work report that to date 25 per cent of those listed in the previous editions have failed to reply to a mail canvass for updating purposes.

The mailing was made to the addresses given in the last volume. It has not been possible to locate many and others have undoubtedly postponed their replies for a more convenient time.

The editors point out that information that is not brought up to date by the individuals will not be reprinted in the new edition. Therefore, it is urged that those listed in *Who's Who in Engineering* (7th edition) and who have not done so, return the clipping promptly, or if they did not receive a clipping, to contact the editors (265 W. 45th Street, New York 11, N.Y.).

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Transmitter Broadcasts Longer

Future U. S. satellites can continue broadcasting outer space data to earth up to four times as long as was previously possible, as a result of the development of a new transmitter by engineers of the DuKane Corporation, St. Charles, Ill., under contract to the Naval Research Laboratory.

The tiny "broadcasting station" weighs less than 3 ounces, and occupies less than 6 cubic inches of space (a cigarette package occupies about 7 cubic inches). For a power output of 500 milliwatts, it uses one-half to one-fourth the battery power needed by any other transmitter now known.

The transmitter was developed as a 500 milliwatt version of the Naval Research Laboratory's 100 milliwatt satellite transmitter. In designing the new transmitter the DuKane engineers achieved a better efficiency as well as the desired power level.

DuKane engineers emphasized that although the circuit works and works well, months of extensive development and testing will be required before it can be programmed into an actual satellite.

Commenting on the revolutionary nature of the new transmitter, Michael Supitilov, DuKane Director of Research, said, "It's as though someone rearranged the parts in an automobile engine that normally gave 20 miles per gallon and came up with 40 to 80 miles per gallon of gasoline."

In satellite programs, this means a highly significant saving in weight, since fewer batteries can do the same amount of work. Or, using the same batteries, the satellite transmitter can broadcast for a much longer period of time.

This particular transmitter, described by Supitilov as a "new combination of known components," is designed primarily for use in the satellite program. Its broadcast signals would be used in telemetering information on space conditions to monitor stations throughout the world, and as an aid to tracking the satellite's path.

The efficiency of the new transmitter could facilitate getting a rocket to the moon by substantially reducing the payload requirements.

The combination of light weight and low battery drain suggest other uses, as

well, in both military and civilian applications. Police, F.B.I., fire department, and civilian defense applications have been suggested. The new circuits would make possible a radio transmitter small enough to fit into a shirt pocket, or be built into an infantryman's helmet.

The crystal controlled transmitter employs three recently developed Western Electric transistors. The special circuits employed give much greater overall efficiency than is now possible with vacuum tubes. A tube transmitter, for the same purpose, would need five times the battery voltage and five times the battery power needed by the new transistor development.

DuKane engineers say the transmitter can be operated on solar batteries, drawing its power from the sun and sending out its signals indefinitely, but with one-half to one-fourth of the rocket surface heretofore required for sun exposure.

Typically, the output stage of a conventional tube-type transmitter doing the same job would need 4,620 milliwatts power to produce 900 milliwatts output. By contrast, the output stage of the new transmitter needs only 930 milliwatts power to produce the same output. The corresponding efficiencies are 11 per cent and 54 per cent.

As an additional advantage, the DuKane circuit operates on a single 20 to 24 volt battery, whereas a tube-type transmitter requires two different types of batteries, a low-voltage filament supply and a high-voltage plate supply.

Tubes also generate heat, and the heat must be dissipated, a problem which crops up often in miniaturization. The transistor circuit greatly reduces this problem. Simplified circuitry and reduced shielding problems because of low operating impedances also make it possible to squeeze an amazing amount of transmitting power into extremely small space.

Until now, transistors have not lent themselves very well to efficient VHF (very-high-frequency) operation, when high output power was needed. The electronic breakthrough making this possible is the result of more than eight months of intense research and development work by a DuKane research team.

Good Enlargements

An electronic circuit developed for radar and fire-control equipment is now being used for uniform enlarging of photographic prints, reports *Electronics*. Exposure and contrast information is set on an electronic timer, and the result is an exposure time that will not vary more than two per cent of the set value.

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Inductance Meter

Wayne Kerr Instruments announces the availability of a new Inductance Meter, Type M-149, designed for the simple and direct measurement of inductance values between 0.05 uH and 100 mH.

The inductance meter is ideally suited as a production testing instrument. Errors due to the self-capacitance of the coil under test are minimized by the use of a large standard capacitor. Provision is also made for the measurement of low capacitance and the approximate value of Q at resonance frequency. The instrument makes possible the rapid and accurate checking of components whose value must be established within tolerance on a volume basis.

The basic circuit of the instrument consists of an oscillator of high stability which can be tuned over the range 16 kc to 5 mc, loosely coupled via a buffer stage to a resonant circuit consisting of a standard fixed capacitor and the inductance to be measured. Resonance is obtained by adjusting the oscillator frequency, the tuning dial being calibrated directly in inductance. The resonance point is indicated by means of a "Magic-Eye" with an incorporated sensitivity control.

For further information on the new Wayne Kerr Inductance Meter, Type M-149, write Midwest Engineer, Key 401.

* * *

Impact Wrench Calibrator

A new and larger model in its line of calibrating equipment, an impact wrench calibrator specifically engineered for wrenches used with bolts up to 2½" in diameter, has just been developed by the Skidmore-Wilhelm Manufacturing Company, Cleveland.

It constitutes the largest impact wrench calibrator ever built.

The new model was originally manufactured to meet the specific needs of one company, but because of its general application, is now being made available to industry at large.

To calibrate a wrench, the required size bolt is inserted in the calibrator and

the bolt tightened. If the resulting tension, which is read directly on the gage of the calibrator, is more or less than required, necessary adjustments are easily and quickly made on the wrench.

Additional information may be obtained by writing to Midwest Engineer, Key 402.

* * *

Mixers

The CHAIN Belt Company has extended the "REX New Look" to include their 5 and 5½ yard sizes. Incorporated in these new models is the modern, functional design introduced earlier in the larger, 6, 6½ and 7 yard sizes.

Simplicity and ease of operation characterize the REX 5 and 5½ mixers. A new single-lever control operates clutch, gearshift, brake and automatic throttle. All instruments are conveniently grouped and are embedded in an attractive aluminum panel. The over-all streamlined appearance lowers the total weight over comparably equipped older models and eliminates dirt catching, hard to clean corners.

Aiding in the greatly stepped-up speed of charging and discharging are all of the features of the larger REX models. These include larger diameter and steep-sloped hoppers for faster charging and anti-spillage insurance. Faster drum RPM over former models and new drum shrink blades increase charging speed and concentrate mixed materials at the front end of the drum contributed to the mixers' ability to carry a greater

payload. The improved blading imparts a faster more thorough mixing action resulting in quality concrete, mixed to the most rigid specifications. The blading system from front to back also accelerates discharging action which is further improved by the low-angled drum and wider, deeper dished chutes.

A wide range of options for any operating requirement are offered. Air pressure or water pump, saddle or top mounted flush tanks or a two compartment siphon-type measuring device water tank are available. The new 5 and 5½ models may be equipped with either the rear-mounted separate engine power or REX FEPTO (Front Engine Power Take-Off). Whichever the selection, greater legal payload mountings on shortest wheel-based trucks is possible.

Information and more details on the new REX mixers may be obtained from your local REX distributor or by writing Midwest Engineer, Key 403.

* * *

Conditioning Control

A new air conditioning control that cuts balancing costs by automatically maintaining uniform air delivery from each air conditioning unit in high pressure induction systems, has been developed by Trane, La Crosse, Wisconsin.

The new device—an Air Flow Regulator—is a major advance that also trims installation and operating expenses of Trane UniTrane induction air conditioners—the only conditioning unit of its type offering these cost-saving advantages.

In spite of its many desirable features for big building perimeter air conditioning, the high pressure induction system presented a serious problem in the past.

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This has been the problem of balancing air distribution, and—keeping it balanced.

Formerly, it was frequently necessary to re-balance when cooling requirements changed as a result of occupancy, room partition fluctuations and other changes affecting heat load in a specific area.

The new Trane Air-Flow Regulator eliminates this balancing problem, at the same time assuring an accurate system balance that is very difficult to achieve using ordinary manual balancing procedures.

In addition, installation of an entire induction perimeter system is made easier.

Now, induction UniTrane units can be balanced before they are even placed into operation.

And, when varying building or tenant needs affect required cooling capacity, a single manual operation adjusts the air delivery volume of the units involved. At the same time, other regulator equipped units in the system adjust automatically.

Primary air delivery from the induction UniTrane unit is automatically held constant regardless of variations in supply duct pressure. A sensitive diaphragm controls a damper blade in the regulator to prevent fluctuations in air conditioner performance. The damper blade action is regulated by a calibrated adjustment rod. This rod is easily set externally to determine the control point. Desired air delivery is maintained within 5%.

The new Trane Air Flow Regulator is constructed of corrosion-resistant materials. It is built in three and four-

inch sizes for either left or right hand air supply to conditioners.

For further information about the new air conditioning advance, write on your firm's letterhead to Midwest Engineer, Key 404.

* * *

Optical Dividing Head

The George Scherr Company announces a new OMT-Optical Dividing Head which has been primarily designed for inspection and light machining purposes.

The critical indexing work which is required today for the manufacturing of things that fly, or mechanisms that must control angular motions to hit targets at a distance, to measure degrees, minutes and seconds, to eliminate angular velocity errors and vibrations in quick running mechanisms etc. make the Optical Dividing Head the LAST WORD in indexing precision.

This new model OW12-OMT-Optical Dividing Head is of extremely robust construction, the spindle being mounted in solid bearings, and embodies a non-deflecting clamping device. The back face of the Dividing Head is scraped square to the base and the axis of the spindle so that the head may be used with the axis of the spindle in the vertical or horizontal plane. Direct readings to 2 seconds of arc are accomplished by employing a micrometer eye piece which is illuminated by low voltage bulb. For coarse adjustment, an external scale ring is provided close to the eyepiece.

Rotation is effected by a hand wheel through a worm and worm wheel, which

can be disengaged for rapid positioning simply by movement of a lever. A positive non-deflecting locking device is operated by a knurled knob adjacent to the eyepiece. Work can be held either in collets or between centers, and a face plate is provided. Tailstock and a base plate unit are standard equipment. Center height is 3 1/4" and the maximum distance between centers is 14 1/2".

The OMT Optical Dividing Head is very reasonably priced. If readings in minutes are sufficient the still lower priced model OW7 is available.

Fully illustrated 4 page folder with complete price information may be obtained by writing Midwest Engineer, Key 405.

Audio Oscillator

Wayne Kerr Instruments announces the availability of a new Audio Oscillator, Type S-121. The Audio Oscillator, Type S-121, is a precision instrument providing a stable, controlled signal in the frequency range of 10 cps to 120 kc. The oscillator offers accuracy and stability normally found in signal generators.

The oscillator either selects major intervals of this frequency range, or for the accurate measurements of short cut-off filters and resonance curves, provides a continuous fine control of frequency on an open horizontal scale. This feature is extremely convenient, since in most routine audio frequency work, response curves are plotted on a logarithmic frequency scale involving only major intervals. The S-121 Audio Oscillator combines both these functions quite simply.

The frequency setting is accomplished by four decades covering the range of 10 cps to 120 kc, to an accuracy of 1%. In each range, there are ten fixed frequencies selected by a switch with a continuously variable control with a logarithmic scale interpolating between them. The interpolating control gives a fine adjustment of frequency and an open scale at any point in the range whenever it is required to measure sharp resonances or rapidly changing responses.

Further information on the new Wayne Kerr Audio Oscillator, Type S-121, write to Midwest Engineer, Key 406.

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Heat Exchanger Plant Opened

A new \$1.2 million manufacturing plant has just commenced operation at The Trane Company in La Crosse, Wis. The plant will be used to manufacture heat exchangers for multiple purposes including heat dissipation in guided missiles and jet aircraft.

The 76,800 square foot production facility represents one of the final phases of a two-year \$13 million Trane building and expansion program in La Crosse.

According to Trane Vice President H. C. Rooks, "There is increasing emphasis on speed at every turn. As a result, the problems of heat dissipation, especially in jet aircraft and guided missile programs, are becoming more varied and complex. One of our jobs is to see to it that there is equipment available to answer the problems."

The plant, 160 feet by 480 feet, more than doubles existing production area for this type units.

Heat exchangers produced in the new plant will have widespread applications as components for systems designed to meet exacting requirements.

Defense uses include installations as part of systems cooling electronic components, cockpits and engine oil in jet and turboprop aircraft, and for cooling purposes in connection with the government's IRBM and ICBM development programs. The new swept-wing B-58 Hustler supersonic bomber and mobile units that produce liquid oxygen, a fuel for guided missiles, are Trane equipped, as is the McDonnell F-101 jet fighter which recently set new speed records.

The exchangers will also be used as part of the air conditioning systems for comfort cooling Convair's first "880" jet luxury airliners. Other jet transports which will use the exchangers are Boeing's "707" and the Fairchild Friendship.

Trane units are components of systems which are used in the peripheral radar defense of our nation in the DEW (Distant Early Warning) Line. This communication line is set to flash the first warning of any enemy approaching from the north. Closely associated is the use for cooling equipment on White Alice (Alaska Integrated Communica-

tion Exchange) which provides a microwave network linking isolated communities and defense installations across Alaska.

In addition, Trane exchangers are used in test nuclear reactors. Other exchangers made by Trane are being used in related atomic energy applications. One installation is using banks of fin-and-tube coils to provide heat for a building. This heat is being drawn from a reactor and actually represents an early development in the use of atomic energy for comfort heating.

The units also are used in the steel industry in the production of tonnage oxygen. The oxygen is blown into blast furnaces to speed up iron ore smelting. The steel industry is using this "richer breath" to increase output.

Trane fin-and-tube coils and fans will be fabricated in the new plant for air conditioning inter-city buses. Also, Trane will build units here for the first air conditioned transit or city buses going into service in the East this summer.

General construction features of the plant include eight-foot high concrete block foundation walls with cemesto panels above. Windows are the steel framed projecting type, and the roof deck, three-inch precast concrete covered with pitch and gravel.

The building is so arranged to provide future expansion in two directions without disturbing existing major equipment installations.

Architect for the plant was Schubert Sorensen and Associates, and prime con-

tractor, Wisconsin-Minnesota Construction Company.

Computer Helps Build River Drives

An electronic computer that solved in fifteen minutes a complex engineering design problem which formerly took as long as 420 hours to complete was utilized in accelerating the design program for the completion of the Harlem River Drive and the modernization of the East River Drive, it was announced by Manhattan Borough President Hulan E. Jack.

The IBM 704 electronic digital computer was used for the first time by his staff in engineering projects involving local government, Borough President Jack declared.

Mr. Jack also stated his office would make available to engineering departments in all levels of government the computer program and instructions necessary in the interests of efficiency and lessening expenditures on public projects.

Initially, consultations were held between engineers representing Mr. Jack, and Applied Science Representatives of The Service Bureau Corporation, an IBM subsidiary. The Service Bureau Corporation provides high-speed data processing services.

The particular problem was the design of composite stringers for two elevated highway structures, each approximately 3,000 feet long, as well as for several smaller overpass structures. Normally, in construction of this type, columns are designed in a rectangular arrangement.

Design of these structures was complicated by the existence of many major

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subsurface structures in the waterfront areas. These structures included several subway tunnel crossings, a railroad tunnel crossing, gas and water main crossings, and a vast complex of electrical distribution equipment.

By hand, this design is very laborious and time-consuming. In addition, it is the type of work that actually wastes engineering skill. Utilization of the computer frees engineers for more creative work.

Meetings were held in order to determine the best method of presenting the problem and its associated data. This work is necessary in order to set up a program which would produce an economical and efficient solution to this problem. After some study, the program was written.

A contract was prepared for the preparation of a program, the solution of the problem, and the tabulation of results. This contract was advertised for public bidding and The Service Bureau Corporation was the low bidder.

Once the program was written, the IBM 704 computer, located at the N. Y. Data Processing Center of The Service Bureau Corporation, calculated the complete design of the 300 composite stringers in just 15 minutes.

The program as it now stands is flexible enough to solve similar problems on any job. Since the program has been written and is available, it is possible for other engineering departments to use it at a low cost.

In the interest of making this information known to the engineering profession, a seminar on the design of composite stringers was held at the Hotel Delmonico, Park Avenue and 59th St., on Wednesday, March 12th.

Missile Systems Pose Problems

Guided missiles systems on latest aircraft carriers now under construction are posing electrical problems, it was reported in Washington, D.C. on Apr. 29 at a Marine symposium during the Middle Eastern District Meeting of the American Institute of Electrical Engineers. The report was made by J. R. Cole and M. L. Garbacz, of the U. S. Navy Department Bureau of Ships, in a paper, "Special Power and Lighting Systems on Aircraft Carriers."

From an electrical view, the missile systems "involves supplying power for missile guidance systems, missile checkout, and missile launching," they said. "Although this appears simple enough it is not actually so, since most of these systems require very nearly transient free power closely regulated in voltage and frequency and at voltages and frequencies other than that of the ship's basic generating plant.

"For example, certain equipment associated with missile guidance requires 400 cycle power with voltage and frequency tolerances not to exceed plus or minus one-half per cent of steady state values and transients of less than 1 per cent of steady state with a recovery time not to exceed 0.1 seconds. In order to meet these requirements it has been found necessary to isolate each load and provide a special motor-generator set for its supply. These sets employ a magnetic clutch to regulate frequency and specially designed voltage regulators to regulate voltage.

"The motor-generators along with other special power supplies are fed from the ship's basic distribution system. Consequently great care must be

taken when laying out the system to isolate big motor loads and other loads that would create large voltage fluctuations which may be relected in the output of the power supplies.

"Since loss of power to any component of this system can be very serious, the system is laid out so that alternate sources of power can be provided in the event of such a condition. To do this most economically, a very limited number of standby power supplies are installed and together with the required power supplies are so arranged as to form a secondary distribution system. Eventually, it is hoped that with the development of suitable line regulators and electric speed governors the large number of small motor-generators can be replaced with a few large centrally located motor-generators to supply the system. This would effect a saving in weight and space."

The authors observed that today's aircraft carrier power system is 10 times greater than the first carrier in 1930. This increased power demand is the result of higher ship speed, larger hulls and more electronic gear. Use of higher distribution voltage on the Carrier Forrestal, they said, has resulted in a weight saving of 20 tons.

"Dynamics of Flight" Course is Offered

The University of Michigan, College of Engineering, has announced an intensive course in *Dynamics of Flight*. The course is scheduled for Sept. 8-13, inclusive. The course is designed for those in the aircraft and related industries who are concerned with dynamics problems but who have no specific background in aircraft dynamics. An introduction to aerodynamics and aeronautical nomenclature is included. Topics covered include equations of motion of the rigid airplane, stability derivatives, static-stability and control, linearized flight equations, longitudinal and lateral transfer functions.

July 14 is the closing date for registration. Further information may be obtained by writing to Professor R. M. Howe, Room 1523, East Engineering Building, University of Michigan, Ann Arbor, Mich.

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C-6779 METALLURGIST

Grad. age to 35; 5+ yrs. in steel metallurgy. Duties: Chemical & physical analysis of steel, set up & superv. procedures for the heat treating of bars, fine pitch gears $\frac{1}{2}$ " in diam. to coarse pitch gears 35" in diam. in single or small lots & the hardening, flame hardening of steel & brazing of carbides for a mfgr. of mach. tools sal. open loc. Ill. employer will pay the fee.

C-6781 DESIGN & DEVEL. ENGR.

Grad. EE-Electronics; 2+ yrs. in transistorized circuitry. Duties: Design & devel. on speakers, audio, tone arms, etc. for phonographs. Good oppor. to work into position of asst. chief electronics engr. for a mfgr. sal. \$550 loc. Chgo. employer will pay the fee.

C-6789 CHIEF ENGR.

degree in CE or Arch. Engr. preferred; age 32-50; 5 yrs. exper. in struct. steel fabricating, knowl. of struct. detailing & struct. design necessary. Duties: To superv. & develop an engrg. dept. of approx. 10-15 people engaged in struct. steel detailing & design, for a struct. fabricating firm, fabricating abt. 18,000 tons per year sal. \$12-20,000 loc. Midwest employer will pay the fee.

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Grad. EE or ME; 2+ yrs. in motor field. Duties:

Sales trainee in office handling correspondence, quotations & general engrg. work for mfgr. of fractional hp. gear reducer motors. Will be transferred into field sales work, potential district manager position sal. open dep. on qualifications, loc. Chgo. employer will pay the fee.

C-6791 SALES ENGR. Civil or Arch. 1+ yr. in design, construction or sales. Duties: To contact arch., engrs., contractors, small bldrs., etc. to promote use of wood & lumber some travel for a trade assoc. sal. \$6000+ dep. on exper. loc. Chgo. employer will pay the fee.

C-6795 SAFETY ENGR. BS in engrg. age 30-35; 5-8 yrs. in safety engrg. know safety rules & practices for both construction & shops. Duties: Safety superv. over various construction jobs & over mfg. shops, travel car req'd. sal. \$7-9000 dep. on exper. loc. Chgo. employer will negotiate the fee.

C-6797 SALES ENGRS. CIVIL-SANITARY

Graduates, recent grad. or exper. Duties: Sales for manufacturers of municipal, water, sewage & waste treatment eqpt. serving entire U.S. Exper. preferred, sal. rec. grads. \$5400 Exper. \$600+ comm. locations: Midwest, Pacific Coast & South East, employer will negotiate the fee.

C-6798 (A) HIGHWAY ENGR.

Grad. CE age 30-40; 5+ yrs. exper. in planning, administration & economics of highways. Should have previous exper. with a state highway dept. or bureau of public roads. Will work with highway & federal agencies. (B) DESIGN & CONSTRUCTION ENGR. on air field pavements exper. with airforce, Navy

or Gov't. Agency. Will contact Gov't. agencies, Engrs., Cities, Counties & other airport agencies, travel for a trade assoc. sal. up to \$10,000 dep. on exper. loc. Chgo. Hdqrs. employer will pay the fee.

C-6799 PROJECT ENGR. Mech. age 30-40; 5+ yrs. exper. in design & layout, knowl. of cement or material handling eqpt. Duties: To take charge of mech. des. & spec. on cement & power plant layouts for a consultant sal. \$8000 dep. on exper. loc. Chgo. employer might negotiate the fee.

C-6801 DESIGNER-FANS ME — pref. upper $\frac{1}{3}$ of class age 23-30; 2-3 yrs. in design work on fans. Duties: Theoretic aspects of design on any type fan involving practical lab. design work. Will report to Chf. Engr. sal. \$7-8000 loc. Midwest employer will pay the fee.

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Research Needs Management

"Management must desert its 'laissez-faire' attitude toward research and take on its active management—or else there is small promise for enhanced effectiveness of this basic company activity."

Such was the gist of a paper by Hathaway Watson, of Booz, Allen & Hamilton, Washington, presented at a management symposium in Washington, D.C. on Apr. 29 during the Middle Eastern District Meeting of the American Institute of Electrical Engineers in the Sheraton Park Hotel.

Predicting that the current annual expenditure of six billion dollars for research and development would be 10 billions by 1960, Watson said: "The motivation is clear. Internationally, scientific advancements are fast becoming indicative of world leadership. Within the domestic economy, businesses are developing an acute awareness that research, as the mother lode of new products, is a necessity of industrial life. Long the growth base of business, research and development, in today's rigorously competitive economy, is fast becoming the means of economic survival. It is insurance for an industrial tomorrow.

"The technical effectiveness of industrial research is acknowledged. The 50 per cent increase in productivity during the last decade, with only a slight increase in production workers, is evidence of this accomplishment. To this must be added the cornucopia of new products—amazing in variety and performance—which continually gives us more abundant living along with the leisure to enjoy these fruits. There is hardly a segment of our living pattern unaffected by research.

"Yet, in some ways, R & D has been disappointing. The chief executives of major corporations point to budget violations, schedule slippage, poor relationships, and low productivity as evidence that research, by and large, does not operate as effectively as other company areas. It is fairly clear that R & D has not reached its full potentiality.

"Reasons for this situation are complex but have a strong causative background in a philosophy—the origin of which seems lost in history—that research is best managed when least managed. Or expressed another way, best

research results are achieved when more freedom and independence are given to the scientists and engineers who populate the activity. Actually, such a philosophy is the antithesis of what is needed and required to achieve greater research effectiveness. Research and development requires the same degree of active, vigorous management that has long characterized administration of other areas of business. More not less, management direction is required if research is to meet its full promise."

Gumperson's Law Applied to Physics

Gumperson's law of perverse opposites: "The contradictory of a welcome probability will assert itself whenever such an eventuality is likely to be the most frustrating," applies to nuclear physics it was said in Chicago on Mar. 19 during the 1958 Nuclear Congress.

"In addition to the normal consideration in the design of a (nuclear) laboratory, the design of facilities for experimental nuclear physics requires special care for personnel protection," reported Daniel L. Weinberg, Astra, Inc., Milford, Conn., in a paper, "Design of Nuclear Laboratories," sponsored by the American Institute of Electrical Engineers. "The facility must be designed on the premise that in spite of all possible precautions taken, radioactive material will seep, flow, pour, or burst from its container and do its best to contaminate the surrounding countryside."

This, he said, is a corollary of Gumperson's law. "Therefore, the facility must be easily decontaminated, special precautions must be taken to prevent spread of contamination, and there must be adequate biological radiation shielding to protect personnel."

When planning a nuclear laboratory, he concluded, the following steps should be taken: Decide on what operations will be performed therein; determine space, staff, and equipment required for these operations; determine supporting facilities required; determine utility requirements and add ignorance (or safety) factor.

"An unusual combination of skills must be presented in the group planning a laboratory. They should have first-hand experience in actually performing scientific and engineering experiments and be able to discuss intelligently the experimental program of the using group. They then can see that tricks-of-the-trade developed after use of similar facilities for long periods are included in your laboratory. In addition they must have practical engineering experience so they can develop practical means for accomplishing the unusual results desired in the facility.

"If the laboratory is to function smoothly after it is built, great care must be taken in selecting the people to whom its planning and design are entrusted."

Tranquillized Plants

A chemical tranquilizer for plants is increasing their yield up to 90 per cent by reducing effects of shock and stress caused by such conditions as heat spells, reports *Chemical Engineering*.

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Reviews of Technical Books



Vector Analysis

Vector Analysis, by *Louis Brand, John Wiley & Sons, Inc., New York 16, N. Y., 1958. Pages, 282. Price, \$6.00.*

As Dr. Brand points out, a vectorial treatment of differential geometry, mechanics, hydrodynamics, and electrodynamics is now practically standard procedure. He formulates the theory needed in these fields, and introduces the wide range of its applications.

For the first time in a book on vector analysis, the author covers vector spaces, including Hilbert space, and the volume is one of the few to develop the gradient, divergence, and curl as tensor invariants. The book covers line vectors—both analytical and graphical—and supplies a full discussion of differential invariants and integral theorems, denoting their applications to mathematical physics. Dr. Brand's systematic development of electrodynamics is based on Maxwell's equations; here, he uses the modern mks system of units, fully illustrated with problems. In addition, the book offers a rigorous treatment of Green's theorems and their application to potential theory. Individual chapter headings include: vector algebra, line vectors, vector functions of one variable, differential invariants, integral theorems, dynamics, fluid mechanics, electrodynamics, and vector spaces.

Dr. Brand's previous books include *Vectorial Mechanics*, *Vector and Tensor Analysis*, and *Advanced Calculus*. Professor emeritus of mathematics of the University of Cincinnati and formerly head of the department, Dr. Brand was recently Whitney visiting professor at Trinity College. He is a visiting professor at the University of Houston during the 1957-8 season.

Air Conditioning

Air Conditioning and Refrigeration, by *William H. Severs and Julian R. Fellows, John Wiley & Sons, Inc., New York 16, N. Y., 1958. Pages, 563. Price, \$10.25.*

This book offers a balanced approach to the fundamentals of both title subjects.

The new book supplies detailed descriptions of all types of heating systems, apparatus for winter and summer air conditioning, and the devices employed in control of humidity, temperature, and pressure, with particular attention given to summer air conditioning. The volume gives the complete procedure for the design of an air washer, and a technique for finding the enthalpy of outdoor air to be used in computing cooling loads when the time of peak load is other than 3:00 p.m. Comprehensive examples and problems also appear on designing hot water heating systems, fan-duct systems, and all year air conditioning systems. The broad coverage includes such subjects as thermodynamics, fluid mechanics, and fuel selection.

The present volume is based on the second edition of *Heating, Ventilating and Air Conditioning Fundamentals*.

In addition to a new chapter on fluid flow and other up-to-date material, the text has undergone thorough rewriting and contains 97 new illustrations.

Metallurgy of Vanadium

The Metallurgy of Vanadium, By *William Rostoker, John Wiley & Sons, New York 16, N. Y., 1958. Pages, 185. Price, \$8.50. This is the second volume in the publisher's series on the Science and Technology of Materials, with J. H. Hollomon as advisory editor.*

Presenting a unified treatment of the extraction, physical and mechanical properties, and processing of vanadium, the new book records the latest scientific data available. Dr. Rostoker's material collates previously scattered papers in addition to the research reports of the Armour Research Foundation sponsored by the Materials Laboratory of the Wright Air Development Center. Through correspondence with numerous research organizations, the author acquired additional information to complete his study.

The contents include: extractive metallurgy of vanadium; physical properties of vanadium; the constitution of vanadium alloy systems; mechanical properties of vanadium and vanadium alloys; technology of vanadium; oxidation of vanadium and associated topics; corrosion and embrittlement of vanadium; metallography of vanadium and its alloys; and vanadium as an alloy addition.

Dr. Rostoker has been associated with the Armour Research Foundation since 1951 and is assistant manager of the metals research department. He was previously affiliated with the University of Birmingham, Illinois Institute of Technology, and the Frankford Arsenal in Philadelphia.

Digital Computer Design

Logical Design of Digital Computers, by *Montgomery Phister, Jr., John Wiley & Sons, Inc., 1958. Pages, 408. Price, \$10.50.*

This book, which is introductory in level, concentrates on techniques and gives their practical application to the design of digital systems by the logical-equation method.

Dr. Phister centers his discussion on synchronous machines, interpreting known advances in the field and contributing original unpublished material. With Boolean algebra featured, a full chapter is devoted to the development of this subject. In another chapter, the author collects and compares all the important Boolean simplifications, including the Quine and Harvard methods as well as the Veitch diagram simplification procedure.

Additional highlights, many of them firsts in a book on this topic, include the systematic method for complete computer design, complete solutions to flip-flop input equations, a description of the logical properties of memories and input-output devices, the Huffman-Moore model, and the Huffman-Mealy method of computer circuit synthesis.

Microwave System Aids Utility

A "unique" loop microwave system used by the city of Austin, Texas power utility since April 1956 to answer the need for a large number of communication channels, was described in Tulsa, Okla. on Apr. 2 during the South West District Meeting of the American Institute of Electrical Engineers.

C. E. Anderson, of the Electrical Department, Austin, Tex. and E. T. Gray and G. A. Griffith of the Westinghouse Corporation's St. Louis and Dallas plants, respectively, said in a paper presented before the meeting that any channel of the microwave system has two alternate directions to reach its termination. Standby protection against equipment failure is provided by switching directions, thereby precluding the necessity of radio frequency (RF) equipment at each station.

"This type of distribution system," they said, "provides such substation with a source of power from two directions so that service continuity is very good. Two line faults at different points on the loop are necessary to isolate a substation.

"Since a great percentage of the faults on a transmission line are temporary in nature, a loop section can usually be put back in service immediately after a fault occurs. Supervisory control is used to provide the continuity of service desired."

Standby power units provide uninterrupted power to the equipment and the system availability exceeds 99 per cent, they said. Alarm systems furnish indication to the station operator of failure of critical channels, as well as failure of RF equipment.

"Maintenance problems," they pointed out, "are simplified by the alarm systems, the loop standby scheme, and the compactness of the system. One man full time and one man part time perform all maintenance of the microwave multiplex, supervisory control, and telemetering apparatus."

The system was installed in a 69 KV loop which serves a large portion of Austin residential as well as industrial areas, the authors said. A microwave system for providing the required communication channels was decided upon as the result of a study which considered

first cost, availability, expandability and maintenance problems, it was reported.

"The microwave system is unique in that it is a loop system," the three men said.

Toll Highway Seeks Additional Financing

A total of between sixty and sixty-five million dollars in additional financing will be sought by the Illinois State Toll Highway Commission to complete construction of the 187-mile Illinois Tollway.

This was announced Mar. 20 in Chicago by Austin L. Wyman, chairman of the commission, who said that the total amount of an additional revenue bond sale would cover the project cost deficit, provide a substantial contingency reserve, interest payments through June, 1960, and the cost of financing the issue.

At the same time, Wyman announced that on the basis of a re-survey of traffic and earnings completed in February, recommended toll schedules have been revised. Charges for passenger vehicles will approximate two cents per mile as compared with one and one-half cents per mile originally recommended by the traffic engineers. This, together with adjustment of rates for other types of vehicles, is designed to produce an increase of approximately 20 per cent in gross toll revenues.

The traffic report, based on the revised toll structure, estimates total gross earnings of \$23,600,000 for 1959, rising to \$47,200,000 in the tenth year of opera-

tion with an annual average for the first ten years of \$37,420,000, he said.

"This means that the coverage—the relationship of earnings to total costs—would be substantially the same as the coverage anticipated in the original bond issue."

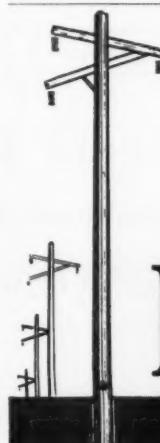
Wyman said that the exact timing of the offering of additional revenue bonds will be decided by the commission based on the advice of its underwriters.

"Although the commission will not require additional funds until later this year, we have made the necessary preparation required for a bond sale in order to move when the needs of the commission and market conditions warrant."

"The issuance of additional bonds was made necessary by rapidly rising costs during the period of construction. While the extensive and rapid industrial and population growth of the area served by the tollway has been a factor in this increase in cost, at the same time, this growth increases the significance of the tollway in the economic life of the area, improving the revenue potential of the project and helping to insure its long-run earnings."

Big Dump Truck

The biggest dump truck in the world, a monster capable of carrying a payload of 165 tons, is proving itself in tests at Oahe Dam, near Pierre, S.D., reports *Construction Methods and Equipment*. Its overall height is 14 feet; its overall width, 15½ feet. When its 13½-foot hydraulic hoist lifts into end-dump position, the box reaches upward 45 feet, higher than a four-story building. The truck, which has 18 wheels, weighs, when fully loaded, 199½ tons.



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News of Engineers

Arthur S. Marvin, MWSE, has been appointed vice-president, engineering of U.S. Steel's American Bridge Division, it has been announced by A. J. Paddock, American Bridge president. Mr. Marvin succeeds J. D. Rollins who has been named vice-president, facility planning, United States Steel Corporation.

At the same time, appointments were announced of **F. K. Goodell, MWSE**, as chief engineer for the division, K. D. Cunningham as district engineer, and **O. H. Ormsby, MWSE**, as assistant district engineer.

Mr. Marvin was born at Springfield, N.B., Canada, and is a civil engineering graduate of the University of Colorado. He began with American Bridge as a draftsman at its Gary, Ind., plant in 1924. In 1940 he was made a designer in the division's Chicago engineering department, and seven years later became assistant division engineer at the Pittsburgh engineering offices. One year later he was named division engineer and on April 1, 1955, he became assistant chief engineer. On June 1, 1957, he was appointed chief engineer, the position he held at the time of his latest promotion.

Mr. Goodell received his civil engineering degree from the University of Idaho. He was first employed by American Bridge in 1937 as a draftsman at the Ambridge, Pa., plant and was transferred to the Gary, Ind., plant's drafting department the same year. In 1939 he was appointed junior designer-estima-

tor in the division's Chicago engineering office. Following additional service at Gary from 1940 to 1942, he returned to the Chicago offices where he later became an engineer. In April, 1955, he was appointed district engineer, Pittsburgh engineering office, the position he held prior to his new appointment.

Mr. Cunningham is a civil engineering graduate of Ohio University. He started with American Bridge in 1939 as a draftsman at its Ambridge plant.

Mr. Ormsby is a civil engineering graduate of Michigan College of Mining and Technology. He began with American Bridge as a draftsman at Ambridge in 1937 and was transferred to the Gary, Ind., plant that same year. In 1946 he was advanced to designer-estimator at the Chicago engineering office and became an engineer in 1956.

Henry Pratt Company, Chicago, Illinois, manufacturer of Rubber Seat Butterfly Valves and fabricated products for the Power Industry, has announced the opening of a Western District Sales Office in Los Angeles, California. Named to head the office is Robert L. Armstrong, native of Los Angeles and a former practicing civil engineer in California and Arizona. Function of the new office will be to provide a more effective liaison with Pratt Sales Representatives in the eleven western states.

Charles W. Lerch & Associates, elevator consulting engineers, has moved

to larger quarters in the Board of Trade Building, marking its tenth anniversary. The firm supplies engineering counsel on vertical transportation to a national clientele of building owners, managers and architects from offices here as well as in Denver and San Francisco.

Douglas McHenry, Director of Development, Research and Development Division, Portland Cement Association, on Feb. 26 was elected president of the American Concrete Institute for 1958 at the Institute's 54th annual convention in Chicago. He succeeded Walter Price, director of Engineering Laboratories, U.S. Bureau of Reclamation.

The American Concrete Institute is a national non-profit organization formed to gather, correlate and disseminate information for the improvement of the design, construction, manufacture, use and maintenance of concrete products and structures.

Mr. McHenry, who served for the past two years as vice-president of the ACI, has been director of development at the Laboratories of the Portland Cement Association since 1952. For 12 years prior to that, he was with the Bureau of Reclamation in Denver where he served as head of the Structural Research Section of the Engineering Laboratories Branch and later as head of the Concrete Laboratory Section. From 1934 to 1940 he was with the Tennessee Valley Authority, working on construction of the Norris and Hiwassee Dams and power plants, and on research on the structural behavior of TVA structures.

McHenry is especially well known in engineering circles for his numerous reports and articles on concrete technology.

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and structural design. In 1943 he received the Sanford E. Thompson Award of the American Society for Testing Materials for his paper "A New Aspect of Creep in Concrete and Its Application to Design," and in 1944 the Telford Award of the Institution of Civil Engineers of Great Britain for the paper "A Lattice Analogy for the Solution of Stress Problems."

He has been a member of the American Concrete Institute since 1936, during which time he has served on the Board of Direction and as a member of a number of committees, including duties as chairman of the Technical Activities Committee and Committee on Volume Changes and Plastic Flow in Concrete.

McHenry is a member of the American Society of Civil Engineers, the American Institute of Physics, the Society for Experimental Stress Analysis, the Reinforced Concrete Research Council, the U.S. Committee on Large Dams, and Sigma Xi, science research society. He attended the University of Minnesota.

* * *

Richard W. Fetter has joined the staff of Midwest Research Institute, Kansas City, Mo., as a Research Senior.

Mr. Fetter holds the Associate in Science certificate, 1944, from the Kansas City, Mo., Junior College, the Bachelor of Science in Electrical Engineering, 1948, and the M.S. in E.E., 1949, both from the University of Illinois.

* * *

Ned A. Ochiltree, Jr. of River Forest, Ill., has been appointed to the newly created position of administrative assistant to the executive vice-president at Ceco Steel Products corporation, Chicago. He was formerly works manager of

the firm's main manufacturing plant. Walter Seabold of LaGrange, Illinois, has been named the new works manager.

Ochiltree joined the company in 1947 as a member of the works engineering department. He was appointed successively assistant works engineer, assistant works manager, and in 1955, works manager.

* * *

Election of K. B. Wolfe, retired lieutenant general of the Air Force, and Art Linkletter to the board of directors of Cohu Electronics, Inc., was announced March 6 by President La Motte T. Cohu in Wilmington, Del.

Wolfe, executive vice-president and a director of the Garrett Corp., also is president of the Oerlikon Tool & Arms Corporation. While in the Air Force, he was commanding general of the materiel command and a deputy chief of staff in The Pentagon.

Linkletter, nationally known radio-television star, is on the board of directors of the Flying Tigers, the Diners Club, and Territory Rice, Ltd., of Australia. He is president of Touch-Plate Corporation, a vice-president of Royalton, and a partner in John Guedel Productions.

Cohu Electronics, with headquarters in San Diego, Calif., manufactures instruments for communication, measurement and control, including industrial closed-circuit television. Divisions of the company are maintained in San Diego, Van Nuys, Calif., and Schenectady, N. Y.

* * *

Harold Michel has been appointed to the post of vice-president in charge of sales of the newly formed Midco Valve & Fittings, Inc., Evanston, Ill. Michel has been a member of the parent com-

pany, Midcontinent Tube Service, Inc., for the past three years. Previously he was general manager of the Alan Supply Co., Jersey City, and of the Wayne Valve and Fitting Corp., Chicago.

* * *

The appointment of a new manager of Chicago district sales for U. S. Steel's American Steel and Wire Division has been announced. He is B. M. Ashbaucher, for the past ten years manager of the Division's Dallas district.

The announcement was made by Clarence Gilchrist, western area manager of sales for American Steel and Wire.

Ashbaucher, who joined American Steel and Wire in 1939, replaces E. A. Murray, who has been transferred to Cleveland as assistant vice-president sales for the division.

A native of Bluffton, Ind., Ashbaucher is a graduate of Purdue University with a degree in chemical engineering. He started with the division as a sales trainee and after short periods of service at the New Haven and Trenton mills, was transferred in 1940 to the Division's general sales department in Cleveland.

In 1945 he was transferred to New York as manager of the electrical, wire rope construction materials department. After two years in that area he went to Dallas as district manager of sales where he was responsible for American Steel and Wire activities in the Southwestern oil industry.

Mr. Ashbaucher is a member of the American Petroleum Institute, Petroleum Engineers Club, Engineers Club of Dallas, and the Dallas Petroleum Club.

* * *

Sam Horwitz, president of Midcontinent Tube Service, Inc., has announced the formation of an affiliated company, Midco Valves & Fittings, Inc., to provide their pipe customers with necessary adjuncts to tubular steel products.

According to Horwitz, "MidcoTube has specialized in the procurement and distribution of pipe and tubing. We have especially made a name for ourselves in providing hard-to-locate materials. It is a logical extension of our service now to expand into valves, fittings and flanges through the medium of our new company, Midco Valves, to give our customers one-call attention."

The valves and fittings division of Crane Co. has named Midcontinent Tube

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Service, Inc., as distributors of its products. These products thus fit into the new Midco Valves organization. Both MidcoTube and Midco Valves are located at 2120 Lee St., Evanston, Ill.

* * *

Simpson Electric Company of Chicago has announced that J. R. Whiteside, executive vice-president of that firm has been made president.

Simpson, having its main plant and office in Chicago, with branch plants in Aurora, Ill. and Wisconsin, manufactures electronic test equipment and meters.

* * *

Frank J. Palermo, who started to work for the J. I. Case Company in the heat treating department in 1934, has been named to the newly-created post of director of manufacturing, according to an announcement by Marc B. Rojtman, executive vice president.

Rojtman called the appointment "one of the finest moves the company has undertaken."

Palermo will have broad authority for the coordination of all manufacturing activities between the company's eight plants and the Case home office in Racine and will report directly to the vice-president in charge of manufacturing. He leaves his previous assignment as manager of the company's Bettendorf, Iowa plant to take up the new position.

Palermo brings a formidable background of "firing-line" engineering and production experience to the new post since he has been closely connected with almost every phase of Case's manufacturing operations.

Palermo's steady rise has been based on a top performance record. In 1940 he was promoted to plant engineer at the company's Rock Island, Ill. plant. In 1941 he was transferred to Racine as supervising staff engineer, where he stayed until 1948 when he was promoted to superintendent of the Case operation at Anniston, Ala. He became works manager of the Anniston plant in 1953, remaining until his appointment to head up the Burlington, Iowa plant when it was reopened for industrial equipment production early in 1957, following the company's merger with American Tractor Corporation.

After one year at Burlington, Palermo was promoted to Works Manager of the Bettendorf plant.

WSE Applications

In accordance with Article I, Section 5 of the By-Laws of the Western Society of Engineers, there is published below a list of applicants for admission received since the last issue of the Midwest Engineer magazine.

Charles B. Robbins, Assist. to the Pres., Procon, Incorporated, 1111 Mt. Prospect Rd., Des Plaines, Ill.

Roland H. Olson, Structural Engr., Portland Cement Association, 111 W. Washington St.

John E. O'Fallon, Regional Engr., American Institute of Steel Construction, Inc., 53 W. Jackson Blvd.

Laurence A. Kane, Sales Manager, Traffic Control Corp., 33 N. LaSalle St.

Henry E. Seibert, Assist. Engineer, Illinois Bell Telephone Co., 212 W. Washington St.

John T. Seibert, Assist. Engineer, Illinois Bell Telephone Co., 208 W. Washington St.

Milton Snyder, Engineer-Operating Practices, United States Steel Corp., 3426 E. 89th St.

Theodore G. Nichols, Assist. Supt., Plant Facilities, Armour Research Foundation, 10 W. 35th St.

Contact Rectifiers Called Highly Efficient

Semiconductor and contact rectifiers are economic and highly efficient sources of low voltage high current D.C. power for the operation of electrochemical cells, it was reported in East Lansing, Mich., on May 6 at the Great Lakes District Meeting of the American Institute of Electrical Engineers.

The efficiency of the rotating D.C. motor and unipolar motor generator sets is also "quite high," said Wilbur A. Stelzer of the Dow Chemical Company, Midland, Mich., at an electrochemical session, but "the cost of the semiconductor and contact rectifiers should be the lowest." The availability of such sources of power for cells operating below 100 volts and as low as 6 volts resulted in the development of a cell designed for a current of 100,000 amperes, he said.

"It can be expected," he said, "that electrochemical cells using even larger currents will be developed in the near future."

The rectifiers described by Stelzer as suitable for low voltage current electrochemical cells are the mechanical contact rectifier and the germanium and silicone semiconductor rectifiers.

He pointed out that the electro-chemist has been for some time and still is seeking D.C. power equipment that can supply very large currents at low voltage.

"This he finds necessary," he said, "because the characteristic of the water-salt solution electrochemical cell requires low voltage at a high current. Since this results in the use of a large amount of power, the cost of the power becomes a major factor in the operation of the electrochemical cell."

Because highly efficient low voltage D.C. power supplies had not been available in years past, he said, the electrochemical cells had been designed for a current of 10,000 amperes in most installations. Then, he said, in order to obtain the desired production unit, the cells were connected in series until the typical number used required about 750 volts.

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IIT Dedicates New Building

A new \$1,350,000 electrical engineering and physics classroom building at Illinois Institute of Technology, Chicago, was dedicated at 2:15 p.m. Monday, April 7.

The building is named Siegel Hall in honor of the late David T. Siegel, trustee of Illinois Tech and president and founder of the Ohmite Manufacturing Co., Skokie, Ill.

Siegel Hall, at 3301 S. Dearborn St., will house electrical engineering and physics classrooms, offices, departmental libraries, and a 346-person capacity auditorium. It is the 22nd new building to be constructed at IIT since 1940 when Lewis Institute and Armour Institute of Technology were merged to create Illinois Tech.

Siegel Hall also contains high voltage spectroscopy, solid state physics, and light laboratories, and a machine shop. Other physics and electrical engineering laboratories are incorporated in the building, as well as space for an analog computer and IIT's A-C network calculator.

Dr. John T. Rettaliata, WSE treasurer and IIT president, made the dedicatory statement at the ceremony in the auditorium of the new building. Addresses were presented by Dr. L. A. Turner, director of physics at Argonne National Laboratory, and John W. Evers, president of the Commonwealth Edison Co.

Hans Sorensen, 3101 S. Wabash Ave., honor student in electrical engineering at IIT, unveiled a portrait of Siegel which will hang in the building's lobby.

An honor student in physics, Miss Loretta Silverman, 2806 N. Sawyer Ave., unveiled the dedicatory plaque.

The invocation and dedicatory prayer was given by IIT Chaplain William D. Faughnan. Music was furnished by Illinois Tech music groups under the direction of H. E. Nutt. A reception and tour of the building followed.

Construction on Siegel Hall was started June 11, 1956. The structure was designed by Ludwig Mies van der Rohe, director of IIT's department of architecture, who collaborated in the execution of the over-all plan for Technology Center, the name given to the IIT campus. Pace Associates were associate architects.

Siegel presented Illinois Tech with the initial donation for a new electrical engineering-physics building at Technology Center before his death in March, 1957.

Bechtel Corporation To Design Reactor

The Atomic Energy Commission has selected the Bechtel Corporation of San Francisco, California, as the architect-engineer for the nuclear reactor to be constructed at Hallam, Nebraska, by the Commission under a cooperative arrangement with the Consumers Public Power District of Nebraska.

The nuclear power plant will be operated by Consumers as part of its electrical generating system. The Commission has assigned technical responsibility for the nuclear reactor facilities to Atomics Inter-National, a division of North American Aviation, Inc., of Los Angeles, California.

The Consumers project was proposed in the first round of the Commission's

power demonstration reactor program.

The project will consist of a Sodium Graphite Reactor (SGR) feeding steam to conventional turbo-generator equipment. The plant is to be designed to produce 75,000 net electrical kilowatts of electricity. Approximately three and one half years will be required for design and construction.

MIDWEST ENGINEER

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Electricity Travels on Railroad

When Philadelphia's big new generating plant is finished most of its electric power will be transmitted by railroad—literally.

The 650 million watt capacity station now under construction by the Philadelphia Electric Company at Chester, Pa., will utilize existing railroad rights-of-way to transmit power throughout the company's system, E. B. Shew and F. W. Myers, Company engineers, reported at the Middle Eastern District Meeting of the American Institute of Electrical Engineers in Washington on Apr. 30, in a paper, "Electrical Features of Eddystone Station."

While this is not the first time railway rights-of-way have been used for power lines, it is believed that Philadelphia Electric's use is the most extensive to date—some 75 miles are to be so utilized.

"Three-quarters of the system load and nearly 70 per cent of the generating capacity (of Eddystone Station) are within a ten mile band along the Delaware River extending from the Delaware-Pennsylvania State Line, through the cities of Chester and Philadelphia to the head of navigation near Morrisville, Pa.," they reported. "The 220 kv transmission system centering at Plymouth Meeting Substation near Norristown lies to the northwest of this area and must be interconnected with it. In order to distribute over 600 mw of capacity from one location through this densely populated portion of the territory into the rest of the system requires a number of transmission avenues which were available only in the form of exist-

ing rights-of-way or the expensive alternate of subsurface construction. A study of the territory revealed that railroad routes, supplemented in a few cases with relatively short stretches of underground cable, could be utilized for this purpose. While this idea is not novel with the Philadelphia Electric Company, it is believed that the extent to which it is used in this project is outstanding.

"Accordingly, the transmission problem for the Eddystone project involves construction of approximately 100 miles of high voltage lines (principally 132 kv). About two thirds will be constructed on railroad rights-of-way and over half of this will be supported on railroad electrification structures extended and modified to accommodate power transmission lines. . . . On non-electrified railroad rights-of-way, entirely new structures are built. It is expected that considerably less than 20 miles of underground 132 kv pipe type cable will be required to reach the railroad routes."

Among the unusual electrical features of the project, they said, are two super-critical pressure cross-compound generating units rated at 325 million watts each, with steam conditions at the throttle of the first unit at approximately 5,000 pounds per square inch and 1,200° F. The second unit will operate at 3,500 psi and 1,050° F.

Conservation

Conservationists "down under" are going up in the air to develop Australia's rough but potentially valuable

land, reports *Chemical Week*. The Aussies are using stubby, two-winged planes that can carry a ton of fertilizer, insecticide, herbicide or plant seeds to tame 14 million acres of scrub-covered land in Queensland.

People are Important To Automation

Though often accused of pre-empting the individual, automation's most important element is people.

This was the opinion expressed at the Morrison Hotel in Chicago April 21 by Dr. Gerhard A. Nothmann, manager of mechanical engineering research at Armour Research Foundation.

Speaking at the third annual Conference on Automation, sponsored by the University of Chicago, Nothmann said that the most important kind of automation in the future will rely on people who can incorporate many technical disciplines into complex processes.

He said that only with a marriage of various scientific and engineering elements will automation achieve interesting and significant developments.

"Such a union will not only require people who are specialists in a number of fields," Nothmann added, "but those who can get down to fundamentals as well."

This requires that engineering students be given the entire breadth of technical education.

It used to be that after graduation much course work in such areas as mathematics, kinematics, electronics, and dynamics was laid aside, leaving professional growth primarily to practical experience, Nothmann pointed out.

In contrast, today's graduating engineering student can be assured that the technical and scientific knowledge which he has acquired will be vital in helping him become a member of a team designing a modern, complex automation system.

Car Refrigerator

A dashboard-mounted automobile refrigerator is now being readied for market, reports *Product Engineering*. The unit has no moving parts and there is no direct operating cost. It works by vaporization and recondensation of gasoline, drawn from and returned to the engine.



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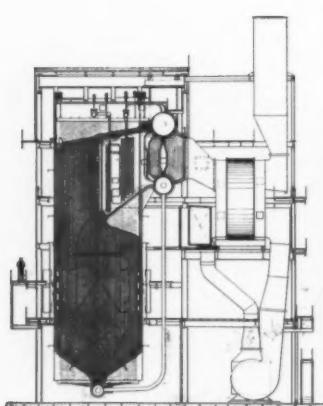
The boilers illustrated here cover the broad capacity range from 4,000 to 600,000 lb of steam per hr. They are all especially designed for gas and/or oil firing. The two units illustrated at right (Types VP and VU-55) are standardized and each is available in several sizes. The capacity range covered by these two units is from 4,000 to 120,000 lb per hr. The two units below are custom designed for various capacity, pressure and temperature requirements up to 600,000 lb per hr, 1400 psi and 950 F. All these units are pressure fired and do not require induced draft fans.

Collectively, they offer an exceptional diversity of choice. A brief consideration of the features of each type will help you "pinpoint" the design characteristics best suited to your particular needs.

Of course there are other C-E two drum Vertical-Unit Boilers available for pressures up to 1400 psi and temperatures up to 960 F. Shown here are but four popular members of the C-E family of Vertical-Unit Boilers—a family which has achieved a wide measure of acceptance using all types of fuel.

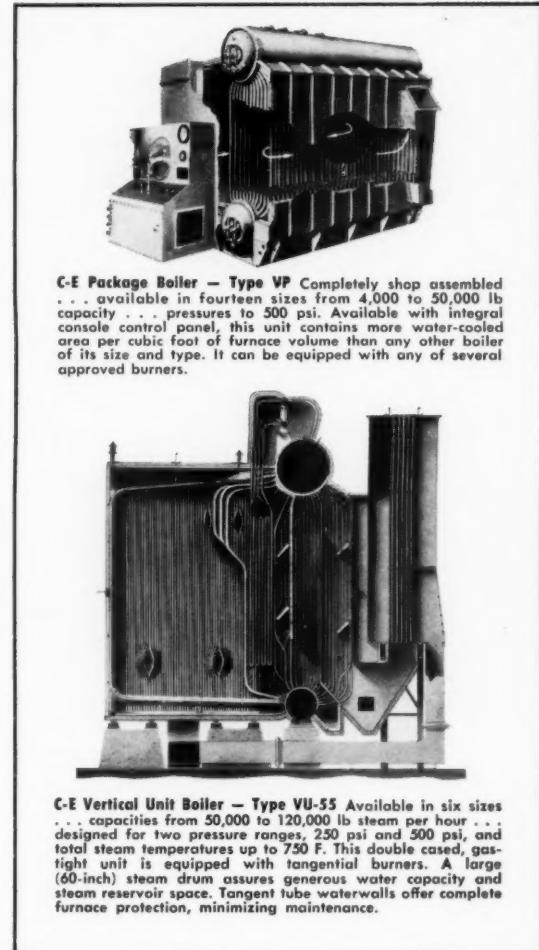
Please feel free to call on us for further detailed information. Catalogs are available upon request.

B-922-A



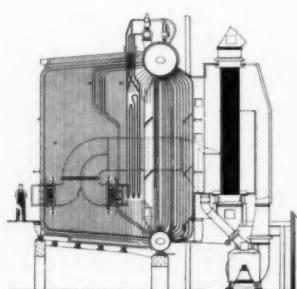
C-E Vertical Unit Boiler —
Type V2

This unit is available for capacities from 200,000 to 600,000 lb per hr. It can be designed for pressures up to 1400 psi and for temperatures to 950 F. Tilting tangential burners, providing superheat control, are standard equipment although horizontal burners are available, if desired. A double, gas-tight casing assures lifetime tightness and minimum heat loss. Heat recovery equipment can be furnished as desired.



C-E Package Boiler — Type VP Completely shop assembled . . . available in fourteen sizes from 4,000 to 50,000 lb capacity . . . pressures to 500 psi. Available with integral console control panel, this unit contains more water-cooled area per cubic foot of furnace volume than any other boiler of its size and type. It can be equipped with any of several approved burners.

C-E Vertical Unit Boiler — Type VU-55 Available in six sizes . . . capacities from 50,000 to 120,000 lb steam per hour . . . designed for two pressure ranges, 250 psi and 500 psi, and total steam temperatures up to 750 F. This double cased, gas-tight unit is equipped with tangential burners. A large (60-inch) steam drum assures generous water capacity and steam reservoir space. Tangent tube waterwalls offer complete furnace protection, minimizing maintenance.



C-E Vertical Unit Boiler —
Type VU-50B

This unit is available for capacities from 50,000 to 400,000 lb per hr—pressures to 1400 psi and temperatures to 950 F. This bottom-supported design uses tilting tangential burners providing effective superheat control. Horizontal burners can be furnished if desired. Heat recovery equipment as required. This unit makes available to industrial installations a standard of performance comparable to utility practice.

COMBUSTION ENGINEERING

Combustion Engineering Building

200 Madison Avenue, New York 16, N. Y.







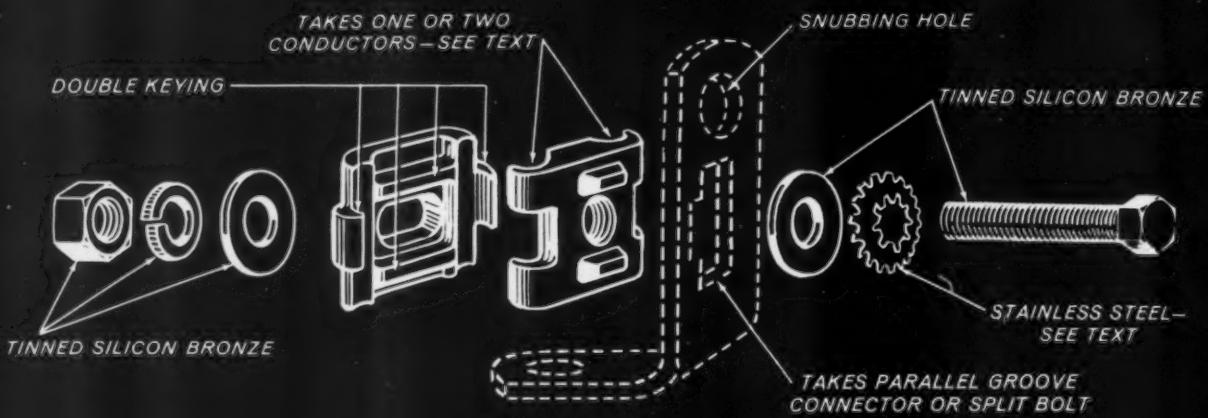
Midwest Engineer

SERVING THE ENGINEERING PROFESSION

DIRECTORY ISSUE of the Western Society of Engineers 1958

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now! parallel groove connectors on S&C's Open Cutout

If you're coming into a cutout with aluminum, chances are you will want a parallel groove connector. With S&C's Type XS Open Cutout you can have this feature at no charge.

Expressly designed for use with aluminum conductors, this new parallel groove connector has an unusually large gripping area. The connector halves are doubly keyed to each other, insuring uniform gripping of conductor, regardless of size. The connector takes one or two aluminum conductors—copper too, of course—up to 2/0 stranded or 1/0 ACSR.

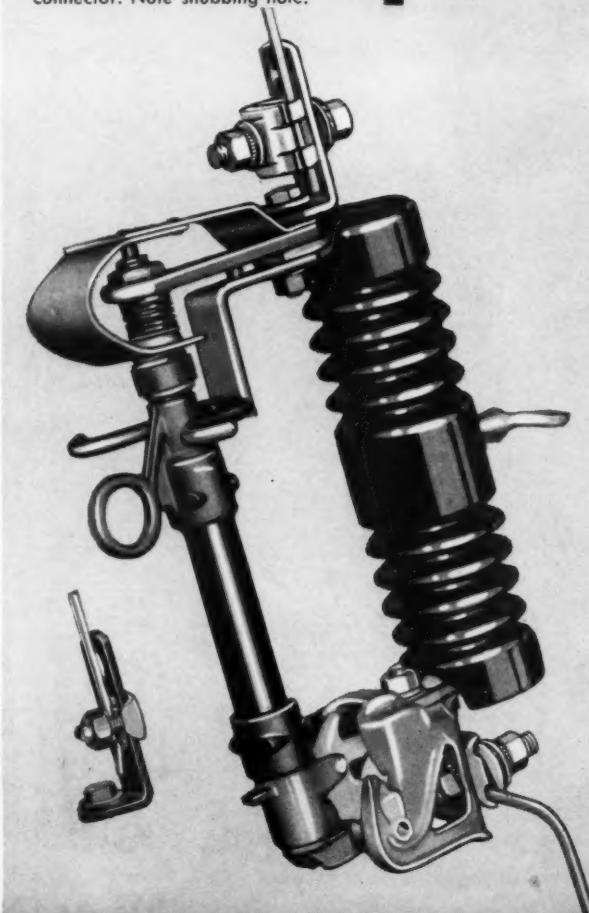
Making connections is easy. Connector halves are keyed to each other and to the cutout to prevent rotation. You need only one wrench to make up the connectors, since a stainless steel internal-external tooth lockwasher holds the connector body mounting bolt against turning. And, for each tightening of the connector with lineman's tools, there is a generous size nut—5/8" across flats.

Larger parallel groove connectors are available at slight charge. These connectors accommodate one or two conductors, from No. 2 solid aluminum (or copper) to 4/0 standard aluminum, copper, or ACSR.

As an optional standard the split-bolt connector is available at no extra charge. Maximum conductor size is No. 1 stranded—copper or aluminum.

S & C Electric Company, 4437 Ravenswood Ave., Chicago 40, Ill. In Canada: S & C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ont.

Type XS Open Cutout—7.5 kv, 100 amperes continuous, 12,000 amperes interrupting—shown with parallel groove connectors. Insert (below) shows optional split-bolt connector. Note snubbing hole.



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Serving the Engineering Profession



APRIL, 1958

PART TWO

VOL. 10, No. 11

Message from the President

The past 12 months have indeed been gratifying ones for the Western Society of Engineers. During the year your Society has reached even further toward fulfillment of the objectives for which it was founded.

As an engineering organization for all engineers, the Western Society has attempted to broaden the scope of interests for the individual member. In this way, we are helping to develop better engineers who can contribute to the support of industry and other interests of the community. Speakers at luncheon and sectional meetings have provided diversified engineering topics. Subjects have run the gamut from rocket acoustics to the expansion of the Sanitary District of Chicago and the technical mind of Abraham Lincoln. This program of diversification has given the engineer the opportunity to acquaint himself with the endeavors and progress in technical fields beyond any narrow horizons.

In view of our recognized position as the coordinating agency of the profession in the Midwest, it was quite proper that the Society was asked to sponsor the Conference on Engineering and Scientific Education. You will recall how this conference last October attracted leading engineers and educators from many parts of the world to Chicago's Edgewater Beach Hotel. Quite recently, we participated in the 1958 Nuclear Congress as one of the cooperating sponsors, a role we also fill at the American Power Conference and the Military Industrial Conference, both annual affairs.

Great progress, too, was made on the social side of our program. Our "Night in Paris" party did what it was intended to do. It attracted many members' wives to a get-together where they could meet other engineers and perhaps increase their awareness of their husbands' activities and professional problems.

New members, the life blood of any organization, have arrived in gratifying numbers. With the increased interest in engineering and scientific progress, more and more young engineers may be expected to become members of the Western Society.

No society, of course, can be better than the combined efforts of its membership. Your officers are striving always to make your Society an even greater institution. With your help, we can reach this goal.

Ormas G. Smith

The Western Society Of Engineers

CONSTITUTION

Adopted May 31, 1922 with Subsequent Amendments
Including Amendment Adopted May 14, 1955

ARTICLE I

Name and Location

Sec. 1. The name of this association shall be The Western Society of Engineers.

Sec. 2. The offices of the Society shall be located in the City of Chicago, Illinois.

ARTICLE II

Objects

Sec. 1. The objects of this Society shall be the advancement of the theory and practice of engineering, the improvement of the status of engineering practice as a profession, and the maintenance of high professional standards.

ARTICLE III

Seal

Sec. 1. The seal of the Society shall be as reproduced herewith.



Sec. 2. All official instruments issued by or under the authority of the Society shall be authenticated by this seal. The Secretary of the Society shall be the custodian of the seal.

ARTICLE IV

Policy

Sec. 1. The Society shall neither endorse nor recommend any individual or any scientific or engineering production, except in the interest of the public or the profession. The opinion of the Society may be expressed on such subjects as pertain to the public welfare.

ARTICLE V

Membership

Sec. 1. The membership shall be open to persons of good character skilled or interested in engineering.

Sec. 2. The membership shall be divided into grades to be known as Honorary Members, Members, Associate Members, Student Members and Affiliate Members.

Sec. 3. The Honorary Members, Members and Associate Members shall constitute the corporate

membership of the Society and have the exclusive right to vote and hold office.

Sec. 4. An Honorary Member shall be a person of acknowledged eminence in engineering, or in a science related thereto, or who has rendered outstanding service to the engineering profession. There shall be no more than fifteen such members at any one time; no more than two may be elected in any one fiscal year.

Sec. 5. A Member, at the time of his admission or advancement to that grade, shall:

Be a graduate of an engineering curriculum approved by the Board of Direction of the Society and shall in addition have had not less than four years of increasingly important engineering experience, indicative of growth in engineering competency and achievement and of a character satisfactory to that Board, at least two years of which shall be in responsible charge of engineering work.

Or, if not a graduate, he shall have had equivalent attainments including not less than ten years of increasingly important engineering experience, indicative of growth in engineering competency and achievement and of a character satisfactory to the Board of Direction of the Society, at least two years of which shall be in responsible charge of engineering work.

Sec. 6. An Associate Member shall, at the time of his admission or advancement to that grade, be:

A graduate of an engineering curriculum approved by the Board of Direction of the Society.

Or, if not a graduate, he shall have equivalent attainments, including at least six years of engineering experience of a character satisfactory to the Board of Direction.

Sec. 7. A student Member shall be registered in an undergraduate or a graduate engineering curriculum approved by the Board of Direction of the Society and shall be pursuing a course of study in preparation for the engineering profession.

He will become an Associate Member automatically upon graduation from said approved course, which graduation is properly attested by a statement from the school or college.

Sec. 8. An affiliate Member shall be a person not qualified for Member or Associate Member grades, but who is interested in the advancement of engineering, as may be evidenced by an employment which has involved dealing or associating with engineers in an executive, professional, or sales capacity for a period of at least two years.

Sec. 9. A non-graduate of an engineering curriculum approved by the Board of Direction may be allowed one half year credit toward the required experience specified in Sections 5 and 6

for each year of such curriculum satisfactorily completed but not to exceed a total of one and one half years.

An applicant who has attended a non-accredited engineering curriculum may be given credit for work satisfactorily completed at the rate of one third year credit for each year of study satisfactorily completed but not to exceed a total of one year.

Sec. 10. All members whose residence or principal place of business is within fifty miles of the Chicago post office shall be deemed resident; those beyond that limit shall be deemed non-resident.

ARTICLE VI

Admissions and Resignations

Sec. 1. All elections to membership shall be made by the Board of Direction. The affirmative vote of a majority of the entire membership of the Board shall be required for election to all grades except Honorary Member. Each candidate elected shall be duly notified of his election, and shall indicate his acceptance of membership by subscription to the Constitution and the payment of entrance fee and dues. If acceptance is not received within sixty days from the date of election, it shall be void unless the time shall be extended by the Board.

Sec. 2. Proposal for Honorary membership shall be submitted in writing by at least fifteen Corporate Members, who shall state their reason for the proposal. Election shall be by ballot, and shall require the affirmative vote of three-fourths of the entire membership of the Board. A person so elected shall be notified promptly by letter. The election shall be void if acceptance is not received within three months after mailing such notice.

Sec. 3. A member may resign by advising the Secretary in writing to that effect. The Secretary shall present such communication to the Board of Direction at its next regular meeting and it shall accept the resignation when all dues are paid.

ARTICLE VII

Fees and Dues

Sec. 1. Fees and dues for the various grades of membership shall be stipulated in the By-Laws, Article II, Section 2. From each of these annual dues \$2.50 shall be set aside as subscription to the publication of the Western Society of Engineers.

On transfer to a higher grade, the entrance fee previously credited to a member shall be applied against the entrance fee for the new grade.

Sec. 2. A person elected to any grade of membership shall pay dues for the fiscal year in which elected, proportional to the part of the year remaining at the time of election.

Sec. 3. If the dues of any member are not paid before December first, he shall lose the right to vote and to receive the publications of the Society.

The Board of Direction may, by an affirmative vote of a majority of its members, grant extension, or excuse members from payment of dues, or waive the entrance fee if in the best interests of the Society.

Sec. 4. A member shall be liable for the payment of dues until he shall have resigned, been expelled, or relieved from the payment of said dues in accordance with the provisions of this Constitution.

Sec. 5. Corporate and Affiliate Members over sixty-five years of age shall not be billed for dues after having paid dues for thirty years, exclusive of dues paid as a Student member. Such members shall be known as Life Members, but this designation shall not be construed to establish a separate grade of membership.

Sec. 6. The fiscal year shall commence with the first day of June.

ARTICLE VIII Officers

Sec. 1. The officers of the Society shall be a President, a First Vice President, a Second Vice President, a Secretary, a Treasurer and twelve Trustees.

Sec. 2. A vacancy in any of these offices shall be filled for the unexpired term by the Board of Direction. The appointee so selected shall not be ineligible for election to succeed himself.

ARTICLE IX Management

Sec. 1. The management of the Society shall be vested in a Board of Direction, consisting of the President, the two Vice Presidents, the Treasurer, the twelve Trustees and the two most recent Past Presidents who continue to be members.

Sec. 2. The Board of Direction shall hold regular meetings at least once every month. A majority of the entire membership of the Board shall constitute a quorum. Special meetings shall be called upon the order of the President, or at the written request of three members of the Board.

Sec. 3. The Board shall supervise the investment and care of the funds of the Society; prescribe the system of accounts; make appropriations for specific purposes; act upon applications for membership as provided in Article VI, Section 1; adopt and revise such By-Laws as may be necessary for the proper conduct of the affairs of the Society and are not inconsistent with this Constitution; appoint such committees as are provided for in the By-Laws; and perform such other acts as are not inconsistent with this Constitution.

ARTICLE X Nomination and Election of Officers

Sec. 1. The President, the Vice Presidents and the Treasurer shall be elected annually and shall hold office for one year and until their successors

are elected and qualified. The trustees shall hold office for three years, four being elected each year starting with the fiscal year beginning June 1, 1954. For the fiscal year beginning June 1, 1952, six trustees, in addition to those elected, shall be appointed for one year by the Board of Direction. For the fiscal year beginning June 1, 1953, eight trustees shall be elected, four for a three year term, two for a two year term, and two for a one year term.

Sec. 2. The Secretary shall be elected by the Board of Direction at its first regular meeting in each fiscal year or at an adjourned session thereof. An affirmative vote of a majority of the entire Board shall be required for election. He shall hold office for one year or until his successor is elected and qualified.

Sec. 3. Each December the Board of Direction shall elect a Nominating Committee of seven Corporate Members, of whom one, and only one, shall be a member of the Board, and not more than three of whom shall have served on the Nominating Committee within the previous three years. The appointment of this Committee shall be announced and suggestions for nominees solicited in the next regular issues of the publication of the Society.

Sec. 4. The nominating committee shall meet not later than January fifteenth and organize by electing from its membership a chairman and a secretary. It shall nominate a President, a First Vice President, a Second Vice President, a Treasurer and four Trustees, except that eight Trustees shall be nominated for the fiscal year beginning June 1, 1953 for the terms provided for in Section 1 of this Article. Before reporting to the Board, the committee shall secure the acceptance of each nominee.

The Committee shall present its report to the Board of Direction at its regular February meeting. If the Board of Direction shall find any nominee ineligible for the office for which he is nominated, or if any vacancy should occur from any cause, the Board shall select another nominee therefore. The nominations so reported shall be known as the Regular Ticket.

Promptly after the February meeting of the Board of Direction, a copy of the Regular Ticket shall be mailed to every Corporate Member.

Sec. 5. Additional nominations for any office provided for in Sec. 4 of this Article may be made by petition signed by at least twenty Corporate Members. Such petition shall be accompanied by the acceptance of the nomination by each nominee in writing and shall be filed with the Secretary of the Society before the twentieth day of March. Any petition so filed shall be presented to the Board of Direction at its regular March meeting. If the Board shall find any person so nominated ineligible for the office for which he is nominated, the petition as it relates to such nominee shall be rejected. Nominations made in accordance with this section shall be known as a Ticket by Petition.

Sec. 6. Corporate Members who are in arrears in the payment of their dues shall not be eligible for office.

Sec. 7. The President shall not be eligible for re-election.

Sec. 8. On or before the first day of April a letter-ballot shall be sent to each Corporate Member on which shall appear the names of all the candidates to be voted upon, so arranged as to indicate nominees of the Regular Ticket and of the Ticket, or Tickets, by Petition.

Sec. 9. The polls shall close at 12 o'clock noon, the fourth Monday in April. The Secretary shall certify to the competency of the voters and

deliver their ballots to three Judges of Election appointed by the Board. These Judges shall canvass the ballots publicly and report the results of the canvass to the Board, which shall, by resolution, declare elected to their respective offices those candidates who have received a plurality of the votes cast. In case of a tie vote between two or more candidates for the same office, the Board shall decide by ballot between the candidates thus tied.

Sec. 10. The officers-elect shall assume their duties on the first day of June.

ARTICLE XI Duties of Officers

Sec. 1. The President shall have general supervision of the affairs of the Society. He shall preside at meetings of the Society, and of the Board of Direction; shall appoint all committees not otherwise provided for, subject to the approval of the Board; and shall be an ex-officio member of all committees. He shall, jointly with the Secretary, sign all contracts and other written obligations of the Society which have been approved by the Board. At the Annual Meetings, he shall report on the general condition of the Society. The Vice Presidents in order of seniority shall preside at meetings and perform the duties of the President in his absence or in case the office becomes vacant.

Sec. 2. The Treasurer shall receive and deposit all moneys of the Society as designated by the Board of Direction. He shall pay all bills when approved in accordance with rules prescribed by the Board. He shall keep regular accounts of all receipts and expenditures in such form as the Board prescribes, which record shall be open at all times to inspection by the Board. He shall give a bond in such amount and with such sureties as the Board may require. He shall make an Annual Report, and such other reports as the Board may require.

Sec. 3. The Secretary shall be the Executive Officer of the Society, subject to the direction of the President and the Board. He shall have charge of the property of the Society, and shall conduct its business, under rules prescribed by the President, sign all contracts and other written obligations approved by the Board. He shall make and preserve a record of all proceedings of the Board. He shall make an Annual Report, and such other reports as the Board may require. He shall give a bond in such amount and with such sureties as the Board may require. The amount of his salary shall be determined annually by the Board at its first regular meeting.

ARTICLE XII Subdivisions

Sec. 1. The Board of Direction may authorize the formation of subdivisions of the Society for the more convenient study and discussion of special fields or functions of engineering, as set forth in the By-Laws.

ARTICLE XIII Meetings

Sec. 1. The Annual Meeting of the Society shall be held on the first Monday in June, at which time the Annual Reports shall be received and other business transacted.

Sec. 2. Other meetings may be called by the President; and shall be called on the request of

ten Corporate Members, which request shall state the purpose of the meeting. Not less than one week prior to the date of each such meeting, the Secretary shall mail to each member a notice which shall state the purpose of the meeting; and no other business shall be considered theret.

Sec. 3. At all meetings of the Society twenty-five Corporate Members shall constitute a quorum.

Sec. 4. Technical and social meetings of the Society and of its subdivisions shall be held at such times and places as may be provided in the By-Laws or approved by the Board.

ARTICLE XIV Discipline

Sec. 1. The Society, through its Board of Direction, shall have the power to investigate and pass upon the conduct of its members alleged to be in violation of the Code of Ethics of the Society or otherwise inimical to the interests of the engineering profession or the Society.

Sec. 2. Upon alleged misconduct of a member coming to the notice of the Board, or upon filing of charges against a member signed by ten or more Corporate Members, the Board shall examine the charges, and if there appears to be sufficient reason for a hearing thereon, shall fix a date for such hearing, and shall, not less than thirty days before said date, notify the accused thereof by registered letter sent to his last known post office address, accompanied by a copy of

the charges and a copy of this Article. At the hearing, the accused may hear all charges and all evidence adduced in support thereof, hear and at his option cross-examine any witnesses called in support of the charges, produce and examine witnesses in his defense, offer documentary evidence, and make an oral and a written statement in his own behalf. Promptly after the conclusion of the hearing, the Board shall consider the evidence and render its decision. A two-thirds vote of the entire Board shall be necessary to sustain the charges. If they are thus sustained, the Board shall fix the penalty at suspension for a stated period or expulsion, and shall notify the member that the decision becomes effective at the end of one month unless the accused previously enters a written appeal therefrom.

Sec. 3. Appeals shall be submitted to the Corporate Members by letter-ballot in a form to be prescribed by the Board. The ballot shall be accompanied by a statement of the charges, the Board's action thereon, together with such information as is deemed proper, and the defense of the member making the appeal. Twenty days after being sent to the Corporate Members, the ballots shall be canvassed by the Board. A majority of the votes cast shall be required to sustain the action of the Board. The Board shall notify the appellant and the Corporate Members of the result of the canvass of the ballots.

Sec. 4. No disciplinary proceedings of the Society shall be given publicity except as provided in this Article.

ARTICLE XV Amendments

Sec. 1. Proposed amendments to the Constitution shall be submitted to the Secretary in writing and signed by not less than twenty-five Corporate Members.

The proposed amendments shall be submitted to the Board of Direction at its next regular meeting and referred by it to the Amendments Committee, which shall report on them to the Board not later than the following regular meeting of the Board.

Sec. 2. Proposed amendments, unless withdrawn, shall be printed and mailed to all Corporate Members at least fifteen days prior to the meeting of the Society at which they shall be the order of business for discussion; they may be modified in any manner pertinent to the original amendments by a majority vote of the Corporate Members present at such meeting.

Sec. 3. The proposed amendments shall then be voted upon by letter-ballot, which ballot shall be due not later than thirty days after the meeting provided for in Sec. 2 of this Article and shall be counted promptly thereafter. In balloting on proposed amendments to the Constitution, an affirmative vote of two-thirds of all the ballots cast shall be necessary for adoption. Amendments so adopted shall take effect at the next Annual Meeting, unless the amendments are accompanied by a resolution of the Board providing that they shall take effect at an earlier date.

BY-LAWS

Including Amendment
Adopted May 14, 1955

ARTICLE I Admission to Membership

Sec. 1. Applications for admission, transfer or reinstatement shall be in such form as the Board of Direction may prescribe. They shall embody a concise statement of the candidate's education and professional experience, with dates and descriptions of work in which he has been engaged.

Sec. 2. **Sub-professional Work** is to cover the time spent as rodman, chainman, recorder, or draftsman; and also the time spent as instrumentman or inspector when working under direct supervision or on work where the personal responsibility and technical knowledge required are small; that is, minor positions in which the responsibility is slight and the individual performance of a task, set and supervised by a superior, is all that is required. It shall also include time during which he has been occupied in engineering work before he is 21 years old, except as modified by the statement in regard to education of Professional Work. No account is to be taken of work done before the applicant is 16 years old, or of work performed during vacations. In figuring the years of "active practice in engineering work" each year of Sub-professional Work shall be rated as equivalent to one-half year of Professional Work.

Responsible Charge of Work Means

a. In the field, the applicant must have had the direction of work, the successful accomplishment of which rested upon him, where he had to decide questions of methods of execution and suitability of materials, without relying upon

advice or instructions from his superior, and of supplying deficiencies in plans or correcting errors in design without first referring them to higher authority for approval, except in cases where such approval is a mere matter of form.

b. In the office, the applicant must have had to undertake investigations, or carry out important assignments, demanding resourcefulness and originality, or to make plans, write specifications and direct the drafting and computations for designs of engineering work, with only rough sketches, general information and field measurements for reference and guidance.

c. In engineering teaching, the applicant must have taught in an engineering school of recognized reputation, and must have had, at least, a grade of assistant professor, or its equivalent.

Design means all that is given above as responsible charge of work in the office, and more. One qualified to design must be able, in the case of any desired piece of engineering, to meet the exigencies of the case, to fulfill the requirements of local circumstances and conditions, and yet not violate any of the canons of engineering. His plan, when executed, must successfully answer the purpose for which it was designed.

Professional Work shall include only the time after the applicant is 21 years old, during which he has been occupied in engineering work of a higher grade and responsibility than that above defined as Sub-professional Work. Time spent in engineering teaching subsequent to graduation shall be listed as professional work.

Sec. 3. An applicant for admission, transfer or reinstatement shall refer to at least three members to whom he is personally known. An applicant for Student grade need refer only to the dean or other authority of the school in which he is enrolled.

Sec. 4. If sufficient information is not received from the requisite number of references, the Secretary shall call on the applicant for additional references. Applicants who may not be per-

sonally known to the requisite number of members may be recommended for membership by three members of the Board of Direction after evidence has been secured sufficient, in their opinion, to warrant admission.

Sec. 5. The names of all applicants shall be published with a request for information regarding their qualifications for membership in the Society.

Sec. 6. Any applicant for admission or reinstatement, whose application may have been rejected by the Board of Direction, may make a new application at any time after one year from the date of the rejection of his previous application. Such new application shall be considered in conjunction with the previous application.

ARTICLE II Fees and Dues

Sec. 1. Dues shall be payable annually in advance and shall become due on the first day of June of each year.

Sec. 2. The fees and dues for the various grades of membership shall be as follows:

	Annual Dues		
	Entrance Fee	Resident Member	Non- Resident Member
Honorary	None	None	None
Member	\$20.00	\$28.50	\$20.00
Assoc. Member (First 7 yrs. in grade)	10.00	15.00	10.00
Assoc. Member (After 7 yrs. in grade)	None	28.50	20.00
Assoc. Member (Transfer from student member)	None	15.00	10.00
Affiliate Member	16.50	25.00	15.00
Student Member	None	3.50	3.50

Sec. 3. Any person whose dues are more than three months in arrears shall be notified of this fact promptly by the Secretary.

Sec. 4. On December 1 of each year the Secretary shall notify all members, whose dues remain unpaid, of the provisions of Article VII, Section 3, of the Constitution. The Secretary shall report on the status of unpaid dues at the April meeting of the Board.

Sec. 5. Any member whose dues remain unpaid shall be reported to the Board at the May meeting, and, unless payment is received or extension is granted, his membership shall terminate at the close of the fiscal year.

ARTICLE III **Duties of** **Officers and Committees**

Sec. 1. At the first meeting of each new Board, one of the Trustees shall be designated as Assistant Secretary, who shall serve without compensation.

Sec. 2. The Secretary, or in his absence the Assistant Secretary, shall attend all meetings of the Board of Direction. The Secretary or his authorized representative shall attend all meetings of the Society and its Sections.

Sec. 3. The Secretary shall be responsible for the employment and supervision of such staff as may be necessary to carry on the work of the Society, including one or more Assistant Secretaries, providing that the employment of such staff is authorized by the Board of Direction.

Sec. 4. All vouchers or checks drawn against the funds of the Society shall be payable only when signed by the Treasurer, President or one of the Vice-Presidents and countersigned by the Secretary or Assistant Secretary.

Sec. 5. The Board of Direction may create an Executive Committee, consisting of the President, the Immediate Past President, the Vice Presidents and the Treasurer, which committee shall exercise such authority of the Board as may be delegated to it when the Board is not in session. It shall report at each regular meeting of the Board of Direction. The Executive Committee shall not have power to amend the By-Laws, elect or expel members, or fill vacancies on the Board of Direction.

Sec. 6. The Board of Direction shall appoint: A Finance Committee, a Program Committee, a Publications Committee, a Library Committee, an Admissions Committee, an Amendments Committee and a House Committee.

Each of these committees, except the Amendments Committee, shall be composed of not less than three Corporate Members of the Society, at least one of whom shall be a member of the Board. The Amendments Committee shall be composed of five Corporate Members of the Society, three of whom shall be the three latest Past Presidents who continue to be members of the Society. At least one member of the Finance and of the Library Committees and two members of the Program and of the Publications Committees shall have served on the same committees during the previous year. The chairman of the Program Committee shall be an ex-officio member of the Publications Committee and the chairman of the Publications Committee shall be an ex-officio member of the Program Committee.

Sec. 7. The Finance Committee shall have immediate supervision over the financial affairs of the Society and shall report thereon monthly to the Board. It shall certify all bills for payment. It shall appoint a registered public accountant

to supervise the accounting and to audit the books of the Society, as of May 31 of each year, which audit shall be included in its report.

The Finance Committee shall submit to the Board of Direction at the regular July meeting in each year a budget of expenses for the current fiscal year. Only routine office expenses shall be incurred in advance of the approval of the budget, except by specific authorization of the Board of Direction.

Sec. 8. The Program Committee shall be responsible for all programs for all meetings of the Society at large, the Sections and the Divisions. It shall commence planning these programs promptly after appointment and not later than the beginning of the third month of the administrative year. The Program Committee shall organize and arrange all programs for meetings of the Society at large. It shall receive the assistance of the Executive Committees of the Sections and the Councils of the Divisions for the purpose of supervising and coordinating all programs for meetings of the Sections and Divisions.

Not later than one month after the close of the administrative year, the committee shall submit its annual report which shall include a complete tabulation of all meetings of the Society, and its Sections and Divisions, together with any recommendations and suggestions which it believes will be of benefit to the Society.

The Committee shall prepare rules, which, when approved by the Board of Direction, shall govern the preparation and presentation of papers.

Sec. 9. The Publications Committee shall supervise the publications of the Society. It shall prepare rules, which when approved by the Board of Direction, shall govern the publications of the Society.

Sec. 10. No paper for presentation or material for publication shall be accepted, which contains information readily found elsewhere, or especially advocates personal interests, or is carelessly prepared, or is foreign to the purposes of the Society.

Sec. 11. The Library Committee shall have general supervision over the library, the relations between The Western Society of Engineers and the John Crerar Library as established under the contract between the two organizations, and the library services established between the Society and the John Crerar Library.

Sec. 12. The Admissions Committee shall investigate all applications for membership and report thereon to the Board of Direction.

Sec. 13. The Amendments Committee shall consider and make a report to the Board on all proposed amendments to the Constitution referred to it in accordance with Article XV, Sec. 1, of the Constitution. It shall also give consideration to formulation and/or revisions of the By-Laws and/or Rules which it considers desirable, or which are referred to it, and shall report to the Board thereon.

Sec. 14. The House Committee shall have general supervision of the rooms in the Society's headquarters and property therein.

ARTICLE IV **Subdivisions**

(Sections, Divisions and Branches)

Sec. 1. A section shall consist of members of the Society interested in the more intimate study and discussion of a particular field of engineering. A section may be formed upon the written application to the Board of five per cent or more of the membership of the Society if in the

opinion of the Board, it is in the interest of the Society as a whole.

Sec. 2. A division shall consist of members of the Society whose professional interests are of the same general character but not restricted to any particular field of engineering. A division may be formed upon the written request of forty or more members of the Society if in the opinion of the Board, it is in the interest of the Society as a whole.

Sec. 3. The Board of Direction may at its discretion abolish a section or division if more than three months elapse from the date of authorization of such section or division before it is in active operation, or if at any time its membership falls below the number required for authorization, or for other satisfactory reasons; but this action shall be taken only after a resolution to abolish such section or division shall have been introduced at a regular meeting of the Board and laid over until a subsequent meeting, at which latter meeting the affirmative vote of two-thirds of the entire membership of the Board, obtained by letter-ballot if necessary, shall be required.

Sec. 4. A branch shall consist of members of the faculty, other instructing staff, and students enrolled in an engineering course in a college of recognized standing.

Sec. 5. The organization, management and operation of sections, divisions and branches shall be in accordance with rules approved by the Board of Direction.

ARTICLE V **Meetings**

Sec. 1. Meetings of the Society and of its subdivisions, for the presentation and discussion of papers, or for social purposes, shall be held as authorized by the Board of Direction, and shall be open to the public except as may be ordered by the Board.

Sec. 2. Regular meetings of the Board of Direction shall be held during the fourth week of each month on call from the President.

The minutes of Board meetings shall be transcribed and sent promptly to each member of the Board.

ARTICLE VI **The Western Society of** **Engineers Foundation**

Sec. 1. The endowment funds of the Western Society of Engineers shall be held in a Special Account of the Western Society of Engineers treasury to be known as the Western Society of Engineers Foundation.

Sec. 2. A standing Foundation Committee shall be created consisting of five past resident Presidents of The Western Society of Engineers. Members of the initial committee shall be appointed by the President of the Society with the approval of the Board of Direction for terms of one, two, three, four and five years respectively. Not later than one month after the close of the administrative year the President of the Society, with the approval of the Board of Direction, shall appoint a new member who shall be a resident past President to replace the committee member whose term has expired, and also additional committee members to fill any vacancies on the committee which have occurred during the previous administrative year. The Executive Secretary of the Society will be a non-voting member of the committee.

Sec. 3. The members of the Foundation Committee may from time to time adopt such resolu-

tions and regulations (not in conflict with the constitution and by-laws of the Society) and may alter and amend the same, as they shall deem advisable for the regulations and transaction of their business. They may prescribe the times of regular and special meetings of the Foundation Committee which may be held without any further notice thereof. The quorum necessary for the transaction of business at a meeting of the Foundation Committee shall be three of the voting members present personally. Such quorum shall have full power to exercise all or any of the powers, authorities and discretions vested in the Foundation Committee. The actions of the Foundation Committee shall be evidenced by resolutions passed by it at a meeting; provided, however, that any action within the authorities of the Foundation Committee may be taken without a meeting by any three or more members and may be evidenced by a writing in any form bearing the signatures of three or more such members.

Sec. 4. Unless otherwise limited or restricted by the terms of any gift, the Foundation Committee may recommend expenditures of income and principal in such manner and in such amount as they in their discretion, shall determine to be in accordance with the objects of this Society in the advancement of the science of engineering and the best interests of the engineering profession.

Sec. 5. The expenditure of such funds shall be limited to those recommended by the Foundation Committee. Such expenditures shall be made by and under the direct supervision of the Board of Direction. The Board of Direction shall have full power, authority and discretion to invest, reinvest, exchange, retain, sell and otherwise deal with the property from time to time comprising the Western Society of Engineers Foundation.

Sec. 6. All vouchers or checks drawn against the funds shall be payable only when signed by the Treasurer, President or one of the Vice Presidents and countersigned by the Secretary or Assistant Secretary.

ARTICLE VII

Miscellaneous

Sec. 1. The Board may formulate rules, conforming with the Constitution and By-Laws, relating to any affairs of the Society. Such rules may be adopted at any regular meeting of the Board by the affirmative vote of a majority of the entire membership of the Board and shall take effect on adoption.

Sec. 2. In all questions involving parliamentary rules, not covered in the Constitution and By-Laws, Robert's Rules of Order shall govern.

Sec. 3. Any member who has complied with the provisions of the Constitution shall be entitled to a diploma certifying his grade of membership. It shall be signed by the President, attested by the Secretary, and bear the seal of the Society.

Sec. 4. The Society may issue badges to its members. The badges shall be of a design approved by the Board, shall bear distinguishing marks for the different grades and may have members' names and dates of membership engraved thereon. Prices of badges shall be fixed by the Board.

Sec. 5. Diplomas and badges shall be issued only on agreement providing for their return on demand by the Board in case of termination of membership.

Sec. 6. It shall be the duty of all members to call the attention of the Secretary to the improper use of the Society badge or symbols, or to claims made by nonmembers that they are members of the Society. The Secretary shall make an investigation and present the facts to the Board.

Sec. 7. The official record of the Society shall be known as the Midwest Engineer of The Western Society of Engineers. It shall be published under the direction of the Publication Committee; shall contain technical papers and discussion, and may include the Constitution, By-Laws, Rules of the Board, annual reports, the membership directory, and such other information as the Board may prescribe.

Sec. 8. The administrative year of all committees, officers of Sections and Divisions and all commissions created by the Society shall coincide with the administrative year of the Society as provided in Article X, Section 10 of the Constitution.

ARTICLE VIII

Amendments

Sec. 1. Any proposed amendment to these By-Laws shall be presented in writing at a regular meeting of the Board, and shall be voted upon at the next regular meeting. The Secretary shall mail a copy to each member of the Board at least fifteen days before the meeting at which action on such amendment is to be taken. An affirmative vote of two-thirds of the entire membership of the Board, obtained by letter-ballot if necessary, shall be required for adoption.

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PFT Floating Cover with aluminum roofing on 65' digester.

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CONSTRUCTION . . .
2 MORE P.F.T.
EQUIPPED DIGESTERS**

Expansion of the Champaign-Urbana treatment plant includes two new 65-foot digesters. The primary digester will have a P.F.T. Floating Cover with prefabricated, aluminum, insulated roofing, and a complete P.F.T.-Pearth gas recirculation system. The secondary digester will be equipped with a P.F.T. gas storage type cover.

At Champaign-Urbana, Illinois . . .

A sewage plant invests in long-range economy

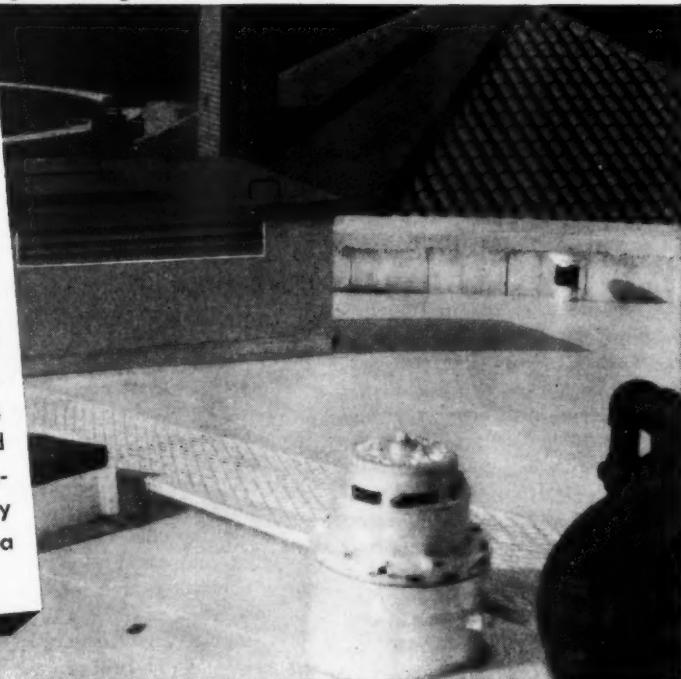
PFT metal roofing on new Floating Cover provides longer life, better insulation

With future economies in mind, the Champaign-Urbana Sanitary District specified a *PFT Floating Cover* with metal-clad roofing for their new 65' diameter digester.

The metal roofing provides four distinct advantages over conventional wood types: (1) longer life—equal to the life of the Floating Cover, (2) more efficient insulation, (3) fewer maintenance problems, (4) easier assembly and installation.



Shown at actual installations, PFT metal sections are easily unpacked and assembled. Cardboard boxes in foreground contain panels as they are shipped.



Section of roofing showing (1) aluminum top sheet, (2) inch-thick fiber-glass insulation, (3) aluminum reinforcing channel, (4) corrugated supporting ribs.

PFT metal roofing consists of prefabricated sections with embossed aluminum top sheets, each piece marked for easy assembly at the plant site. The sections are designed for close fitting in the field with a 3" lap of top metal covering at all joints (see illustration). Cutout sections are provided to fit around sampling walls, hatch framing, manholes, etc.

With fiber-glass insulation, PFT metal roofing resists heat loss and keeps digester heating costs at a minimum.

Ventilators are provided for the space between ceiling plate and roof deck. Also included is a 19" wide walkway of galvanized steel, deformed for sure footing.

The PFT Floating Cover at Champaign-Urbana includes a complete Pearth Gas Recirculation System—

an economical process that controls the formation of scum, making more effective use of the entire digestion tank capacity.

*Design of plant by / Wilson & Anderson, Consulting Engineers
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How WSE Serves Its Members

The Western Society of Engineers, founded in 1869, was the fourth engineering Society to be established in the United States. Its first president was Col. Roswell B. Mason who was elected Mayor of Chicago in the same year and served in the latter capacity during the great fire of 1871. The Society's roster includes engineers from all branches of the profession. Although headquarters are in Chicago and most of its members reside in that area, the Society has non-resident members in every section of the United States and many foreign countries. It is unique among engineering societies and has much to offer engineers of all age brackets from students to men having long records of accomplishment.

The Western Society is so organized that it fulfills five fundamental needs of the engineering profession by encouraging the advancement of:

- (1) The theory and practice of engineering
- (2) The interests of the profession
- (3) The education of its members
- (4) The interests of the community
- (5) The interests of the employer

For the purpose of advancing the theory and practice of engineering, the Society has ten sections, representing different interests, which meet to present and discuss technical subjects.

- (1) Bridge and Structural Engineering
- (2) Chemical and Metallurgical Engineering
- (3) Communications Engineering
- (4) Electrical Engineering
- (5) Fire Protection and Safety Engineering
- (6) Gas, Fuels and Combustion Engineering

- (7) Hydraulic, Sanitary and Municipal Engineering
- (8) Mechanical Engineering
- (9) Traffic Engineering and City Planning
- (10) Transportation Engineering

The professional interests of Western Society members are served through many committees and the operations of four divisions: (1) Consulting Engineers (2) Engineering History (3) Junior Division and (4) Professional Women's Council. In a long term program for the advancement of engineering as a profession, activities for younger members are stressed. This program stems from the recognition by the Society that it has a primary obligation to aid the young graduate in becoming adjusted to his position in the scheme of things. In the development of an engineering career, the value of a professional society cannot be overemphasized. An engineering society can offer the young graduate an opportunity both to keep his technical knowledge up-to-date and to make professional contacts. Participation in society activities also gives him a sense of belonging to the profession, and as a corollary, imbues him with a professional pride.

Midwest Engineer

Professional interest must also be stimulated by good publications. The Western Society has such a medium in its official journal, the *MIDWEST ENGINEER*, which is published monthly. The articles included are concerned with subjects of broad engineering interest. News of Society activities keeps the members in close touch with the work going on. Future meetings are announced and past meetings are reported upon both pictorially and in print.

Awards

To provide incentives for creative work, WSE presents three awards: the Octave Chanute Medal to a member for a paper in the field of civil, mechanical or electrical engineering; the Charles Ellet Award, to a Junior Division member for an outstanding paper and the Annual Cash Award, open to all members and providing a maximum of five \$100 awards for winning papers submitted in the contest.

WSE also participates with the four Founder Societies in the Alfred Noble Prize for excellence of technical papers, and the Washington Award, which recognizes preeminent service in promoting the happiness, comfort and well-being of humanity.

The Western Society provides a direct service to its members in the formulation of programs for post-collegiate training. More often than not, engineers find that they must continue with some schooling in order to attain real success and recognition. For this purpose, the Educational Committee has worked with high-grade engineering schools in the Chicago area to make appropriate night classes available.

For some time the Western Society has sponsored a refresher course at the Extension Division of the University of Illinois, and Illinois Institute of Technology to assist its members in preparing for the State Professional Engineering examinations, which are prerequisite to the granting of a Certificate of Registration.

New Educational Program

The criticism most often directed at engineers is that they know too much of engineering science, and mathematics, and too little of writing, speaking, economics and cultural subjects. The Society believes that the engineer must have an understanding of the contempo-

rary world and its inhabitants in order to utilize his technical skill to the advantage of society and himself. He must be able to express his ideas to others and understand how these ideas fit into the general economic picture. It is indeed difficult for the engineer to acquire all of the background he needs in non-scientific studies during college. He has necessarily devoted a great portion of his time in school to an acquisition of knowledge of the natural laws which are basic to his profession. For these reasons the Western Society is making it possible for the engineer to supplement his knowledge in other fields after leaving school.

The slogan for this General Education Program is "Thinking, Reading, Speaking, Writing." Unless the engineer has developed these talents and can communicate his ideas in a coherent report to superiors and co-workers, they are not of much use to mankind or to his employer. The engineer as a businessman must also carry on some correspondence and frequently write articles for technical publications. He often addresses technical meetings, and if he has civic interest truly at heart, will speak before lay groups to acquaint them with the part engineering plays in their lives. To prepare the engineer for these responsibilities, the Western Society with the cooperation of the Founder Societies is at present sponsoring courses in Business Management for Engineers; Investments for Engineers; Human Relations in Management; and Rapid Reading.

In addition to being scientifically sound, good engineering must fit into the general economic pattern, but not many engineers have had the time nor the inclination to take courses in economics during their formal education. After they have stumbled over a few problems in the workaday world, the need for such background becomes evident.

Young Engineers Forum

The Western Society, industry and the profession recognize that young engineers entering the business world need a broadened objective to develop their own futures to the maximum and to bring to their specialized engineering work a better understanding of the field of engineering as a whole and its place in business generally.

The Western Society of Engineers, therefore, through its Young Engineers Forum, has planned to provide the young engineer with an opportunity to meet and discuss with other young engineers and mature engineers who have become established in their professions. This program is designed to expand the young engineer's knowledge of engineering in the major lines of business in the community.

Leaders in the fields of utility, oil, small businesses, railroads, steel, packing houses and heavy manufacturing have been scheduled to speak at the forums.

Serves Civic Interests

The Western Society serves the civic interests of the community in a number of ways. The Civic committee keeps constant vigilance over civic affairs relevant to engineering. Examples of matters studied by the various subcommittees are civil service operations, registration laws, smoke abatement, building codes, and traffic problems. They are deeply concerned with all engineering problems which affect the health, operation and beauty of the city. As an engineering society of recognized high standing, Western is frequently asked to furnish members for committees of the city and state on public engineering problems. For example, a number of Western Society members are on the City Planning Commission. Members are also working on the Sag-Calumet Navigation Project.

The activities of the Western Society are also of high value to the employer of engineers. Keeping in touch with technical advances and engineering activities is a must for any company that wishes to survive. Personal contacts made at the Society are tangible factors in increasing sales and maintaining business relations. Society participation also increases morale among engineering employees. All concerned benefit from the broadening influence of contact with leading engineers whom the employee meets at Western Society headquarters.

Every purpose of the Society is served by the new Western Society headquarters. It is one of the most outstanding projects in the progressive program of expanded service to the engineering and

scientific professions. It is, furthermore, an important step toward the creation of an engineering and science center for the city of Chicago. These new quarters are appropriately located in the building adjacent to John Crerar Library which has an outstanding collection of technical information. Other scientific and technical groups are also locating in these buildings.

The quarters of the Western Society occupy three floors totalling about 15,000 square feet of space. The Western Society dining room, located on the fifth floor, seats around 300 people, and can be divided into units of various sizes to provide privacy. It is open five days a week for lunch and dinner and by special arrangement at other times. It accommodates the dinner meetings of a number of scientific and technical societies and other groups.

The sixth floor includes a check-room, two lounges, bar, two meeting rooms, WSE offices, and the following offices of other engineering groups: national office of the American Society of Lubricating Engineers, national office of the National Electronics Conference and the local section of the Institute of Radio Engineers, the midwest office of the American Society of Mechanical Engineers, and the Chicago office of the Engineering Societies Personnel Service.

The lounges are beautifully appointed and comfortable. They serve as a gathering place for groups who are holding dinners or programs in the quarters, and their central location makes them an ideal meeting place for engineers and their families. In short, the engineers of Chicago now have a home in the Loop.

On the floor above, an auditorium and other meeting rooms are provided. The auditorium is acoustically treated and well-lighted, is equipped with modern public address and picture projection systems which permit varied and effective program presentation. It is indeed a far cry from the usual hotel banquet room where acoustics are poor and someone's head is constantly bobbing up between the screen and slide projector. There are 200 comfortable theater-type seats in the auditorium and seating capacity can be increased to 300 by using the adjoining room. Otherwise this room can be used separately by a second group having 100 or less in attendance. A

small conference room, suitable for a group of 20, is also located on this floor.

At present, about 75 groups are making use of the headquarters facilities. Appropriate meeting places for these societies have been scarce and expensive, and the Western Society is pleased

that it can offer such service to other societies on a cost basis.

The quarters of the Western Society of Engineers represents an outlay of some \$300,000 which was contributed by members, employers, and a number of industries.

The quarters offer complete facilities to all professional groups of the community, both large and small, and provide the professional people of Chicago with a meeting place where they may reap the full benefits of close association with each other.



Requirements for Membership in WSE

GRADE OF MEMBERSHIP	Years of Experience*	Other Qualifications	References	FEES AND DUES		
				Entrance Fees	Annual Dues	
					Res.	Non-Res.
Member.....	10**....	Practice of Engineering	3 Members.....	\$20.00	\$28.50	\$20.00
Associate (First 7 yrs. in grade).....	6*....	Practice of Engineering	3 Members.....	10.00	15.00	10.00
Associate (After 7 yrs. in grade).....	6*....	Practice of Engineering	3 Members.....	None	28.50	20.00
Associate (Transfer from student member).....	6*....	Practice of Engineering	3 Members.....	None	15.00	10.00
Affiliate.....	2.....	Interested in Engineering	3 Members.....	16.50	25.00	15.00
Student.....	Not Required	Engineering Student in Col- lege of recognized standing	Dean or Other School Authority	None	3.50	3.50

NOTES: **Two of the 10 must have been in responsible charge.

*Graduation from an accredited engineering college is accepted as six years of experience.

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HONOR AWARDS

The Society administers or participates in five honor awards having as their purpose the recognition of engineering accomplishment and an incentive to engineers and members of the Society to ex-

cel in preparing and presenting engineering papers. These awards are the Octave Chanute Medal established in 1901, the Washington Award in 1916, the Charles Ellet Award (for Junior Engineers) in

1929, the Alfred Nobel Prize also in 1929, and the Cash Awards in 1950. A brief outline of the purpose and conditions of each of these awards together with a list of the respective recipients follows:

Octave Chanute Medal

Octave Chanute, during his term of office as president, presented the Society with a fund to provide medals as awards for the best papers in Civil, Mechanical and Electrical engineering presented before the Society during 1901. At the close of his administration in 1902, he do-

nated a much larger fund the revenue therefrom to be applied in awards for prizes for papers read before the Society, under such conditions as the Board of Direction might determine.

During the following years medals have been awarded in General, Civil, Mechanical and Electrical engineering. The present design of the

medal was adopted in 1913 and each medal bears the profile of Mr. Chanute on one side and on the obverse side the year of the award, the name of the recipient, the branch of engineering and the date on which the paper was presented.

The awards of the Chanute medal have been made as follows:

1901

W. D. Pence—Civil Engineering
J. H. Spengler—Civil Engineering
A. Bement—Mechanical Engineering
A. V. Abbott—Electrical Engineering

1902

J. W. Alvord—Civil Engineering
R. E. Milligan—Mechanical Engineering
E. B. Ellicott—Electrical Engineering

1903

A. Marston—Civil Engineering
Storm Bull—Mechanical Engineering
E. Gonzenbach—Electrical Engineering

1904

W. A. Shaw—Civil Engineering
A. Bement—Mechanical Engineering

1905

T. L. Condon—Civil Engineering
C. E. Sargent—Mechanical Engineering
C. H. Smoot—Electrical Engineering

1906

G. H. Bremner—Civil Engineering
W. L. Abbott—Mechanical Engineering
R. F. Schuchardt—Electrical Engineering

1907

F. E. Turneaure—Civil Engineering
W. T. Ray and Henry Kreisinger—Mechanical Engineering
D. W. Roper—Electrical Engineering

1908

H. E. Horton—Civil Engineering
A. N. Talbot—Mechanical Engineering
Morgan Brooks—Electrical Engineering

1909

A. Bement—Civil Engineering
O. Chanute—Mechanical Engineering
R. H. Rice—Electrical Engineering

1910

C. K. Mohler—Civil Engineering
C. P. Berg—Mechanical Engineering
H. B. Gear—Electrical Engineering

1911

John Ericson—Civil Engineering
H. Gansslen—Mechanical Engineering
C. F. Burgess—Electrical Engineering

1912

Onward Bates—General Engineering
D. W. Mead—Civil Engineering
W. L. Abbott—Mechanical and Electrical Engineering

1913

O. H. Basquin—Civil Engineering
T. V. Salt—Mechanical Engineering

1914

Andrews Allen—General Engineering
Norman Stineman—Civil Engineering
Hymen Eli Goldberg—Mechanical Engineering

1915

Curtis McD. Townsend—General Engineering
Wilbur M. Wilson—Civil Engineering

1916

H. B. Sauerman—General Engineering
Clinton B. Stewart—Civil Engineering

1917

B. H. Peck—Electrical Engineering

1924

W. A. Shaw—General Engineering
John F. Hayford—Civil Engineering
Paul L. Battey—Mechanical Engineering

1935-37

W. M. Wilson—Civil Engineering
F. F. Fowle—Electrical Engineering

1937-38

Otto R. Jelinek—Civil Engineering
Earle G. Benson—Mechanical Engineering
J. Paul Clayton—Electrical Engineering

1938-39

Chas. B. Burdick—Civil Engineering
A. G. Shaver—Electrical Engineering

1939-40

Paul L. Battey—Civil Engineering
Gustav Egloff—Mechanical Engineering

1940-41

Lawrence T. Wyly—Civil Engineering
Charles W. Gennet, Jr.—Electrical Engineering

1941-42

Sholto M. Spears—Civil Engineering
Charles W. Larch—Electrical Engineering

1942-43

John B. Jackson—Electrical Engineering

1943-44

Robert L. Anderson—Civil Engineering
Frank F. Fowle—Mechanical Engineering

1944-45

Ovid W. Eshbach—General Engineering

1945-46

George C. Hillis—Communication Engineering

1946-47

Tenney S. Ford—Sanitary Engineering
Albert L. Tholin—Sanitary Engineering

1947-48

Daniel V. Meiller—Mechanical Engineering

1950-51

Charles E. Deleuw—Civil Engineering

1951-52

Horace P. Ramey—Civil Engineering

1953-54

John P. Clennon—Electrical Engineering

Washington Award

The late John W. Alvord, Past President W. S. E., in 1916 proposed the establishment of an honor award by the Society and donated fund for its maintenance. The scope of the award was later enlarged and the name "Washington Award" adopted as a reminder that the first president was an engineer. The four "founder" engineering societies were invited to elect two representatives each to serve on the Commission of Award which also includes nine members to be selected by the Western Society of Engineers.

The purpose of the Award is the "recognition of devoted, unselfish and pre-eminent service in advancing human progress." It is conferred each year upon an engineer whose professional attainments, in the judgment of the commission, have pre-eminently advanced the welfare of mankind. Presentation of the award is made at a joint meeting of the members of the five participating societies.

The token of the Washington Award is a beautiful bronze tablet mounted on a marble

base and bearing an inscription reciting the purpose of the award, name of the recipient, the accomplishment for which it is given followed by the names of the participating societies.

Subsequent gifts by Mr. Alvord have increased the endowment to a substantial amount, enabling the award to be administered in a dignified manner. The Commission has adopted complete rules governing selection of candidates for the award and procedure in choosing the recipient. The names of the recipients and citations of the Award follow:

1919—**Herbert C. Hoover**, Hon. M. W. S. E., for his achievements as chairman, commission for relief of Belgium 1914-17, food administrator of the United States 1917-18.

1922—**Robert W. Hunt**, Hon. M. W. S. E., for his pioneer work in the development of the steel industry in the United States and for a life devoted to the advancement of the engineering profession.

1924—**Arthur N. Talbot**, Hon. M. W. S. E., for his life work as student and teacher, investigator and writer and for his enduring contribution to the science of engineering.

1925—**Jones Waldo Smith**, for the rare combination of vision, technical skill, administrative ability and courageous leadership in engineering.

1926—**John Watson Alvord**, Past Pres. and Hon. M. W. S. E., for his pioneer work in developing the fundamental principles of public utility valuation and his marked contributions to sanitary science.

1927—**Orville Wright**, for fundamental scientific research and resultant successful airplane flight.

1928—**Michael Idvorsky Pupin**, for devotion to scientific research leading to his inventions which have materially aided the development of long distance telephone and radio broadcasting.

1929—**Ben Joseph Arnold**, Past President and Hon. M. W. S. E., for pioneering work in the engineering and economics of electrical transportation.

1930—**Mortimer Elwyn Cooley**, for vision and constructive leadership in the education of the engineer.

1931—**Ralph Modjeski**, Past President and Hon. M. W. S. E., for his contribution to transportation through superior skill and courage in bridge design and construction.

1932—**William David Coolidge**, for his scientific spirit and achievement in developing ductile tungsten and the modern x-ray tube.

1935—**Ambrose Swasey**, for his distinguished contributions as a builder of instruments, institutions and men.

1936—**Charles Franklin Kettering**, for his high achievements in guiding industrial research toward the greater comfort, happiness and safety of mankind in the home and on the highway.

1937—**Frederick Gardner Cottrell**, for his social vision in dedicating to the perpetuation of research the rewards of his achievements in science and engineering.

1938—**Frank Baldwin Jewett**, for inspiring and directing scientific research leading to improvements in the art of communication.

1939—**Daniel Webster Mead**, Hon. M. W. S. E., for his superior contribution to sound theory, good practice and high ethical standards in the creation of engineering works, as an engineer and as a teacher.

1940—**Daniel Cowan Jackling**, M. W. S. E., for pioneering in large-scale mining and treatment of low-grade copper ores, releasing vast resources from formerly worthless deposits.

1941—**Ralph Budd**, M. W. S. E., for vision and courageous leadership in advancing the technological frontiers of high speed railroad transportation.

1942—**William Lement Abbott**, Past President and Honorary M. W. S. E., for advancing the standards of the engineering profession, for aiding combustion research.

1943—**Andrey Abraham Potter**, for distinguished leadership in engineering education and research and patriotic service in mobilizing technical knowledge for victory in war and peace.

1944—**Henry Ford**, for pioneer development of mass production of low cost automotive transportation which revolutionized the way of life of mankind.

1945—**Arthur Holly Compton**, Hon. M. W. S. E., for his research and teaching in the physical sciences, increasing man's knowledge of the action of x-rays and cosmic rays.

1946—**Vannevar Bush**, for outstanding leadership in organizing and directing scientific resources of the nation toward victory in World War II.

1947—**Karl Taylor Compton**, for progressive administration of engineering education for leadership in research and for advancement of American industry in technology.

1948—**Ralph Edward Flanders**, for high technical skill in perfecting the tools of industry and for distinguished service in the field of human relationships.

1949—**John Lucian Savage**, for unselfish public service devoted to the creation of monumental hydraulic structures utilizing natural resources.

1950—**Wilfred Sykes**, M.W.S.E., for invention of electrical machines and steel processes for advances in industrial administration and cooperation for counsel to state and college.

1951—**Edwin Howard Armstrong**, for outstanding inventions basic to radio transmission and reception, and notable service to his country.

1952—**Henry Townley Heald**, for distinguished leadership in engineering education in industrial technology in scientific research and in civic affairs.

1953—**Gustav Egloff**, M.W.S.E., for distinguished leadership in petroleum research and development in professional activities and in community services.

1954—**Lillian Moller Gilbreth**, for her outstanding contributions to engineering and scientific management for her unselfish devotion to the problems of the handicapped.

1955—**Charles Erwin Wilson**, for significant leadership in engineering and management for altruistic devotion to national defense.

1956—**Robert E. Wilson**, for unusual dedication of leadership through science and engineering to the advancement of research, industry, education and public affairs.

1957—**Walker Lee Cisler**, for outstanding and untiring service to his country and mankind by making the world a better place to live through electric power.

1958—**Ben Moreell**, for distinguished service as a skilled engineer, outstanding naval officer, industrialist, Christian layman and Hoover Commission associate.

Alfred Noble Prize

The Alfred Noble Prize was established in 1929 and consists of an award from the income of a fund contributed by engineers and others to perpetuate the name and accomplishments of Alfred Noble, Past President of both the Western Society of Engineers and the American Society of Civil Engineers. The prize consists of a cash award, allowance for travel expense and a certificate

signed by the president and secretary of the American Society of Civil Engineers, which society is trustee of the fund.

The award is open to any member, not past his thirty-first birthday, of the Western Society or any of the four "founder" engineering societies and is given for a technical paper of particular merit on any subject accepted for publication by any of the foregoing five societies.

The recipient of the prize is selected annually by a committee composed of one representative from each of the five societies. The award is made at a general meeting of the society of which the recipient is a member.

The Alfred Noble Prize has been awarded as follows:

1931—C. T. Eddy (A. I. M. E.), for paper, "Arsenic Elimination in the Reverberatory Refining of Native Copper."

1932—Frank M. Starr (A. I. E. E.), for paper "Equivalent Circuits."

1933—Claude Maxwell Stanley, Jr. (A. S. C. E.), for paper "Study of Stilling-Basin Design."

1936—Abe Tilles (A. I. E. E.), for paper "Spark Lag of the Sphere Gap."

1937—G. M. L. Sommerman (A. I. E. E.), for paper "Properties of Saturants for Paper-Insulated Cables."

1938—Ralph J. Schilthuis (A. I. M. E.), for paper "Connate Water in Oil and Gas Sands."

1939—Claude E. Shannon (A. I. E. E.) for paper "A Symbolic Analysis of Relay and Switching Circuits."

1941—Robert F. Hayes, Jr. (A. I. E. E.), for paper "Development of the Glow Switch."

1942—George W. Dunlap (A. I. E. E.), for paper "The Recovery Voltage Analyzer for Determination of Circuit Recovery Characteristics."

1943—Dr. Benjamin J. Lazan (A. S. M. E.), for paper "Some Mechanical Properties of Plastics and Metals Under Sustained Vibrations."

1944—W. R. Wilson (A. I. E. E.), for paper "Corona in Aircraft Electric Systems as a Function of Altitude."

1945—A. L. Ahlf (A. S. C. E.) for paper "Design Constants for Beams with Nonsymmetrical Straight Haunches."

1946—Martin Goland, Jr. (A. S. M. E.), for paper "The Flutter of a Uniform Cantilever Wing."

1947—John H. Hollomon (A. I. M. E.), for paper "The Mechanical Equation of State."

1948—Robert L. Hoss (A. I. M. E.), for paper "Calculated Effect of Pressure Maintenance on Oil Recovery."

1949—John C. Fisher (A. S. M. E.), for "Anisotropic Plastic Flow."

1950—Ralph J. Koschenburger (A.I.E.E.) for paper "A Frequency Response Method for Analyzing and Synthesizing Contractor Servomechanism."

1951—Eldo C. Koenig (A.I.E.E.), for paper "An Electric Analogue Computer Using the Photo Cell as a Nonlinear Element."

1952—Myron Tribus (A.S.M.E.), for paper "Intermittent Heating for Aircraft Ice Protection with Application to Propellers and Jet Engines."

1955—R. L. Bright (A.I.E.E.), for paper "Junction Transistor Used as Switches."

Cash Awards

Beginning in 1950 the Western Society of Engineers established annual Cash Awards for the best papers submitted by members. Five prizes are authorized for distribution annually, each for \$100.

Winners are selected by an Awards Committee, which reserves the right to award less than the five established prizes or to postpone the competition if papers are not of sufficient merit. Any member of the Society, regardless of grade of membership, is eligible. Papers should be of general interest to engineers, but neither highly technical nor of controversial nature.

Winners of Cash Awards are:

1950
C. J. McLean (1st prize)—"Measuring Circulating Water Flow by the Salt-Velocity Method."
Paul Rogers (2nd prize)—"The Structural Aspects of Power Plant Design."
Charles A. Blessing (3rd prize)—"Surveying and Mapping for Modern City Planning."

1951
Albert L. Tholin (1st prize)—"Elevated Walkways for Downtown Chicago."
Ernest L. Abramson (2nd prize)—"The Turbine Type of Peripheral Pump."
Erwin M. Lurie (3rd prize)—"Plaster Cracks—But When?"

1952
Norman E. Brown—"Location of Industries in Chicago and Northern Illinois."
James A. Stewart—"Traffic Engineering Design of Dial Telephone Exchanges."

1953
Lillian Stemp—"The Engineer and the Prospective Employer."

1957
Frank W. Edwards (1st prize)—"Use of Great Lakes Water."
H. Gladys Swope (1st prize)—"Radiation Works for You."
J. H. Euston (2nd prize)—"Betterment of State Highway Programs through Research."

Charles Ellet Award

This award was established in 1929 by a gift from E. C. Shuman, a Junior member, who suggested the name "Charles Ellet Award" as a memorial to that young engineer of Civil War days whose undaunted determination to succeed in the face of overwhelming disappointments outlived the struggle for recognition.

The award is symbolized by a beautiful loving cup on which is engraved, the name of the recipient and the names of their schools. The cup

is on display in the Society's headquarters. As evidence of the honor bestowed, the winner receives an engraved certificate and a prize of \$25.

The award is made periodically to a member under 30 years old, who, in the opinion of a committee of awards, is adjudged to have excelled in the preparation and presentation of a technical paper presented in competition for this award at a meeting of the Junior Engineers.

The recipients of this honor have been:

1930—John D. Burlie—Purdue University.
1932—Francis E. Wolosewick—Armour '27.
1933—Joseph Kuch.
1934—Irving J. Kadie—Chicago Tech. '27.
1935—Grover C. Lewis—Illinois '30.
1936—Robert W. Suman—Armour '34.
1937—George A. Nelson—Armour '35.
1939—Raymond V. McGrath—Univ. of Washington '35.
1940—Ray F. Erickson.
1950—Donald R. Klusman—Washington University, '48.

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Ormas G. Smith was graduated from Armour Institute of Technology with a Bachelor of Science Degree in Civil Engineering in 1923. His first employment was as an Engineer in the Bridge and Building Department of the Illinois Central Railroad.

In 1926, he accepted employment as an Engineer in the Engineering Department of the Illinois Bell Telephone Company. Since then his positions have been Engineer of Buildings, Equipment and Building Engineer, and Plant Extension Engineer. On December 6, 1950 he was appointed Chief Engineer, which position he now holds.

Mr. Smith served as Chairman of the Communications Committee of the Chicago Civil Defense Organization, and during World War II was head of Civil Defense activities for Illinois Bell. In 1952, he spent nine months in New York and Washington serving as chairman of the Communications Panel studying the defense problems of the United States.

William R. Marston
First Vice President

Ormas G. Smith
President

The University of Illinois gave Mr. Marston a B.S. degree in Railway Electrical Engineering in 1931. He subsequently became a staff engineer for the Chicago Surface Lines. He remained with that organization until 1942 when he was employed by the Office of Price Administration as a business analyst. In 1943 he was placed in charge of a transportation unit of the Mileage Rationing Branch of O.P.A.

Entering the Naval Reserve in 1943, Mr. Marston served in the Southwest Pacific.

In 1950 he associated himself with the City of Chicago as deputy city traffic engineer.

Mr. Marston joined the Western Society of Engineers in 1936, and served as a trustee, from 1951 to 1954.

He is a past president of Illinois Engineering Council; past president, Midwest Section of the Institute of Traffic Engineers; and director of the National Institute of Traffic Engineers.





Hjalmar W. Johnson Second Vice President

Mr. Johnson, vice president in charge of steel manufacturing of Inland Steel Company, Chicago, began his career in steel at the Joliet blast furnaces of the Illinois Steel Company. He joined Inland Steel Company in 1929 as assistant superintendent of blast furnaces. In 1949 he was elected vice president in charge of steel manufacturing and in 1954 was also elected a director.

He is a director of the American Institute of Mining and Metallurgical Engineers and a member of the American Iron and Steel Institute. In 1933 he received the J. E. Johnson, Jr. Award from the A.I.M.M.E. and in 1941 was presented the A.I.S.I. Medal. He is considered one of the country's leading authorities on blast furnace technique and is the author of numerous technical papers on the steel industry in general.

Mr. Johnson was graduated from the University of Illinois in 1922 with a B.S. degree in Engineering.

He is a director of the Indiana State Chamber of Commerce, and Friends of the Land. He has served WSE as director, treasurer, and in 1957 was elected vice-president.

In 1933 he received the J. E. Johnson, Jr. Award from the A.I.M.M.E., and in 1941 was presented the A.I.S.I. Medal. He received an honorary doctor of engineering degree from the Michigan College of Mining and Technology, and in 1958 he received the Benjamin F. Fairless Award from A.I.M.M.E.

OFFICERS, 1957-58

J. Earl Harrington Executive Secretary

After Mr. Harrington was graduated from the Illinois Institute of Technology with a B.S. degree in Chemical Engineering, he was associated with the city of Chicago for over ten years in several capacities as Chemical Engineer, Superintendent of Construction, Engineer of Tests, and Materials Consultant. His work in the field of engineering materials earned for him the post graduate professional degree of Chemical Engineer from the Illinois Institute of Technology in 1939.

Shortly thereafter, he devoted some of his time as Special Lecturer at the Institute, until called to Washington to serve as Engineering Coordinator and Expert Consultant to the Quartermaster General. This led to his being appointed Chief of the High Explosive Manufacturing and Raw Materials Divisions of the Explosives Branch of the Ordnance Department, which post he held throughout World War II.

At the close of the war, he divided his time between his consulting practice and his agricultural and manufacturing enterprises.

In addition to his many duties at Western Society, Mr. Harrington is prominent in civic affairs and widely known as a public speaker and lecturer.

He is past president of the International Council of Engineering Societies Secretaries, and State Chairman of Vocational Guidance for the Engineering Council for Professional Development. He became a member of Western Society in 1937.



J. T. Rettaliata Treasurer

Dr. Rettaliata has been president of Illinois Institute of Technology since 1952. He received his B.E. degree in 1932 from Johns Hopkins University, and a Doctor of Engineering degree in 1936. Then he was with the Allis-Chalmers Manufacturing Company as a department head and as manager of the research and gas turbine development division. In 1945 he joined Illinois Tech as professor and director of the department of mechanical engineering.

Dr. Rettaliata is a member, an officer and active on committees of numerous professional, civic and business organizations, including: Fellow of the American Association for the Advancement of Science; Western Society and a member of the Board since 1952; chairman of the Board of Visitors of the Air University; member of the Board of Crerar Library; and on the Board of Directors of 10 companies, including Western Electric Company, American Steel Foundries and the Atchison, Topeka and Santa Fe Railway Company.

He is a nationally known educator, and an authority on gas and steam turbines and on jet propulsion.



Board of Direction

(Continued from Page 15)



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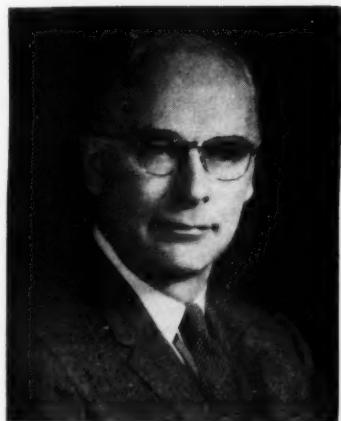
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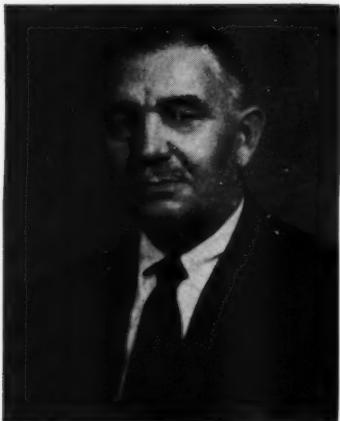
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CHICAGO 22

The Story Behind the Society's Seal



Although all members of the Western Society of Engineers have seen the Society's Seal countless times, perhaps few of the new ones—and some of the old ones—know the interesting background of how the Seal came about and what it stands for.

The story of our Seal begins on March 7, 1882, when Vice President D. C. Cregier appointed a three-man committee to seek designs from among W.S.E.'s membership. Slightly more than two months later, this committee was able to report that it had selected the design submitted by G. A. M. Liljencrantz as the most appropriate one and that it had been approved by the Trustees. The very speed with which the Seal was designed and approved indicates that even in its early days our Society got things done rapidly.

The committee then asked Mr. Liljencrantz to prepare a detailed description of his design. Here is what he wrote:

"It has been the aim of the designer to indicate by appropriate emblems, as far as space and other circumstances would allow, the different branches of engineering represented in the Society, and some of the fundamental branches on which the manifold works of our profession are based.

"Thus, the suspension bridge, the sounding party, and 'Polaris,' the guiding star for those who seek the true meridian, and its assistant, the 'Dipper,' are emblematical of the Civil Engineers. The Mining Engineers are represented by some of their working tools, the sledge, the pick and the drill; while the castle and the cogwheel are the universally adopted emblems of the Military and Mechanical Engineers, respectively.

"These several designs are inclosed in the four fields produced by the construction of the famous 47th problem of Euclid, probably the most prominent and useful problem in geometry, wherefore this has been deemed the most appropriate representative of that important branch of science.

"Algebra and higher mathematics, the calculus, are also represented by well known signs pertaining to these branches.

"Finally, the motto, 'Per ardua ad metam,' which translated means, 'Through Difficulties to the Aim,' intended to indicate the universal purpose of all the different branches of the engineering profession, has been given in Latin, not to intimate thereby that this is the language with which the representatives of our profession are most familiar, but in the first place to get a comprehensive expression in a most condensed form; secondly, to make it more professional in appearance and, finally, because, if I am permitted to use a common phrase, 'They all do it.'"

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CODE OF ETHICS

Formulated by the Engineers' Council for Professional Development, and adopted by the Board of Direction of the Western Society of Engineers, November, 1948.

Also adopted by the following national societies:

American Institute of Consulting Engineers, American Institute of Electrical Engineers, American Institute of Industrial Engineers, American Society of Civil Engineers, American Society for Engineering Education, American Society of Mechanical Engineers, as well as many local organizations in various cities and states.

Honesty, justice and courtesy form a moral philosophy which, associated with mutual interest among men, constitutes the foundation of ethics. The engineer should recognize such a standard, not in passive observance, but as a set of dynamic principles guiding his conduct and way of life. It is his duty to practice his profession according to these Canons of Ethics.

As the keystone of professional conduct is integrity, the engineer will discharge his duties with fidelity to the public, his employees and clients, and with fairness and impartiality to all. It is his duty to interest himself in public welfare, and to be ready to apply his special knowledge for the benefit of mankind. He should uphold the honor and dignity of his profession and avoid association with any enterprise of questionable character. In his dealings with fellow engineers he should be fair and tolerant.

Professional Life

SEC. 1. The engineer will cooperate in extending the effectiveness of his engineering profession by interchanging information and experience with other engineers and students and by contributing to the work of engineering societies, schools and the scientific and engineering press.

SEC. 2. He will not advertise his work or merit in a self-laudatory manner, and he will avoid all conduct or practice likely to discredit or do injury to the dignity and honor of his profession.

Relations with the Public

SEC. 3. The engineer will endeavor to extend public knowledge of engineering, and will discourage the spreading of untrue, unfair and exaggerated statements regarding engineering.

SEC. 4. He will have due regard for the safety of life and health of public and employees who may be affected by the work for which he is responsible.

SEC. 5. He will express an opinion only when it is founded on adequate knowledge and honest conviction while he is serving as a witness before a court, commission or other tribunal.

SEC. 6. He will not issue ex parte statements, criticisms or arguments on matters connected with public policy which are inspired or paid for by private interests, unless he indicates on whose behalf he is making the statement.

SEC. 7. He will refrain from expressing publicly an opinion on an engineering subject unless he is informed as to the facts relating thereto.

Relations with Clients and Employers

SEC. 8. The engineer will act in professional matters for each client or employer as a faithful agent or trustee.

SEC. 9. He will act with fairness and justice between his client or employer and the contractor when dealing with contracts.

SEC. 10. He will make his status clear to his client or employer before undertaking an engagement if he may be called upon to decide on the use of inventions, apparatus, or any other thing in which he may have a financial interest.

SEC. 11. He will guard against conditions that are dangerous or threatening to life, limb or property on work for which he is responsible, or if he is not responsible, will promptly call such

conditions to the attention of those who are responsible.

SEC. 12. He will present clearly the consequences to be expected from deviation proposed if his engineering judgment is overruled by non-technical authority in cases where he is responsible for the technical adequacy of engineering work.

SEC. 13. He will engage, or advise his client or employer to engage, and he will cooperate with, other experts and specialists whenever the client's or employer's interests are best served by such service.

SEC. 14. He will disclose no information concerning the business affairs or technical processes of clients or employers without their consent.

SEC. 15. He will not accept compensation, financial or otherwise, from more than one interested party for the same service, or for services pertaining to the same work, without the consent of all interested parties.

SEC. 16. He will not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with his client or employer in connection with work for which he is responsible.

SEC. 17. He will not be financially interested in the bids as or of a contractor on competitive work for which he is employed as an engineer unless he has the consent of his client or employer.

SEC. 18. He will promptly disclose to his client or employer any interest in a business which may compete with or affect the business of his client or employer. He will not allow an interest in any business to affect his decision regarding engineering work for which he is employed, or which he may be called upon to perform.

Relations with Engineers

SEC. 19. The engineer will endeavor to protect the engineering profession collectively and individually from misrepresentation and misunderstanding.

SEC. 20. He will take care that credit for engineering work is given to those to whom credit is properly due.

SEC. 21. He will uphold the principle of appropriate and adequate compensation for those engaged in engineering work, including those in subordinate capacities, as being in the public interest and maintaining the standards of the profession.

SEC. 22. He will endeavor to provide opportunity for the professional development and advancement of engineers in his employ.

SEC. 23. He will not directly or indirectly injure the professional reputation, prospects or practice of another engineer. However, if he considers that an engineer is guilty of unethical, illegal or unfair practice, he will present the information to the proper authority for action.

SEC. 24. He will exercise due restraint in criticizing another engineer's work in public, recognizing the fact that the engineering societies and the engineering press provide the proper forum for technical discussions and criticism.

SEC. 25. He will not try to supplant another engineer in a particular employment after becoming aware that definite steps have been taken toward the other's employment.

SEC. 26. He will not compete with another engineer on the basis of charges for work by under-bidding, through reducing his normal fees after having been informed of the charges named by the other.

SEC. 27. He will not use the advantages of a salaried position to compete unfairly with another engineer.

SEC. 28. He will not become associated in responsibility for work with engineers who do not conform to ethical practices.



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After each name is an abbreviation showing the year in which each became a member and his present grade. In these abbreviations Hon.M. is for honorary member; M, member; A, associate; S, student and Aff, affiliate.

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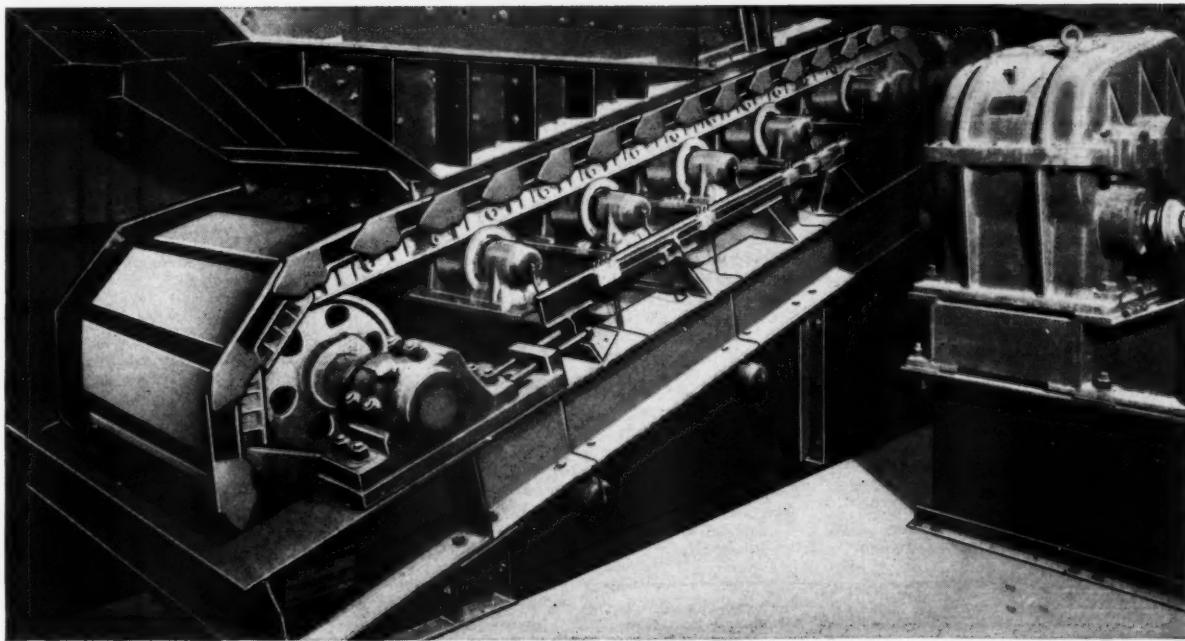
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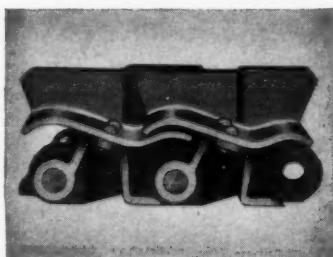


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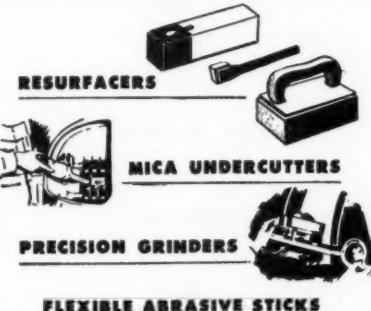
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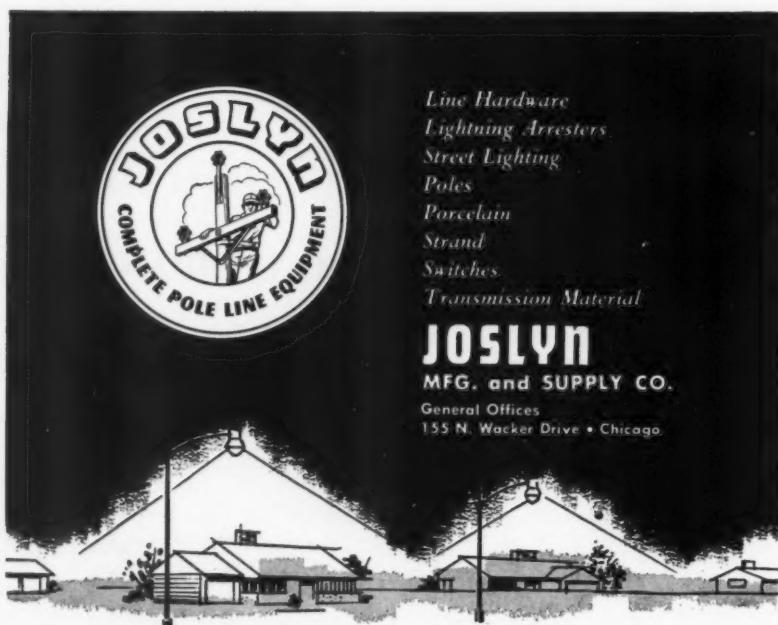
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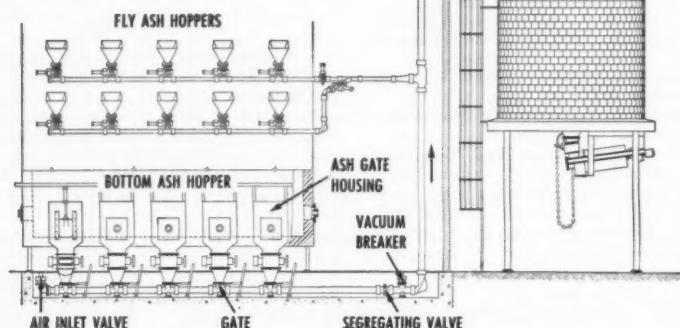


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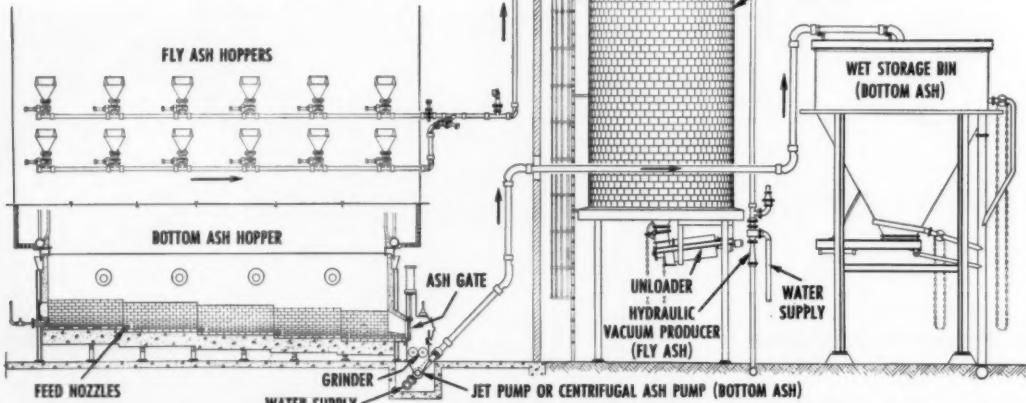
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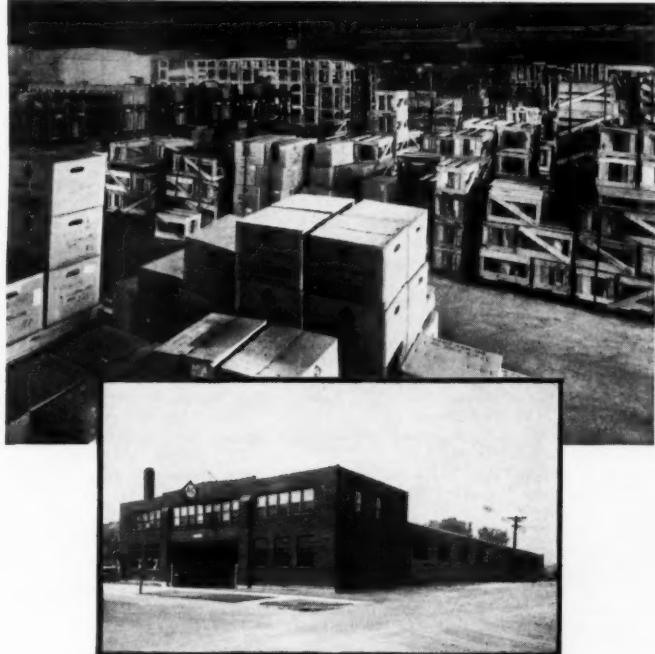
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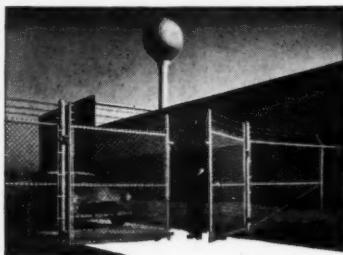
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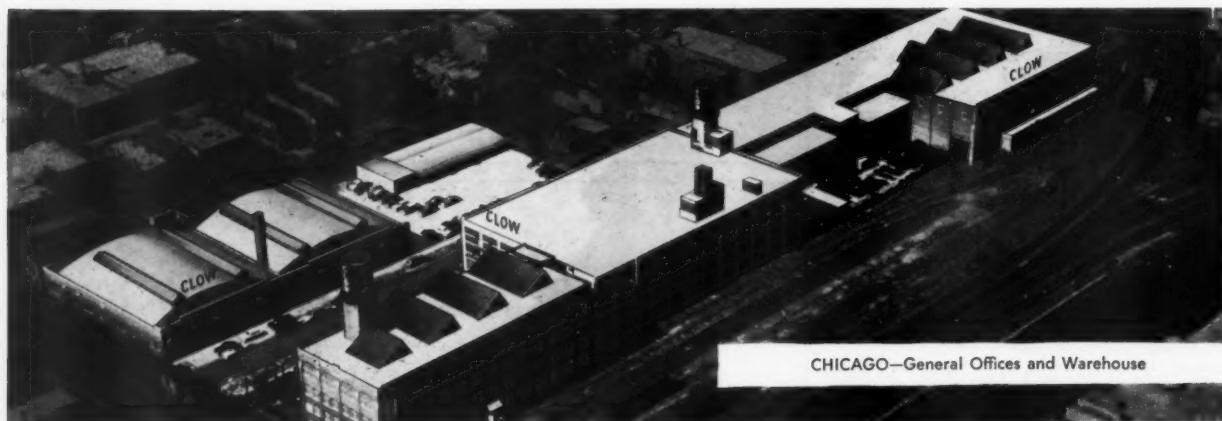
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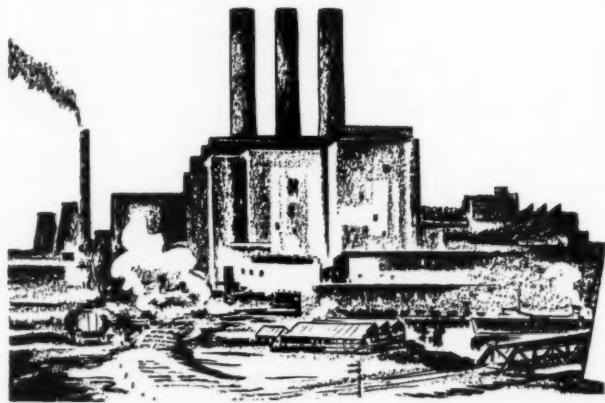
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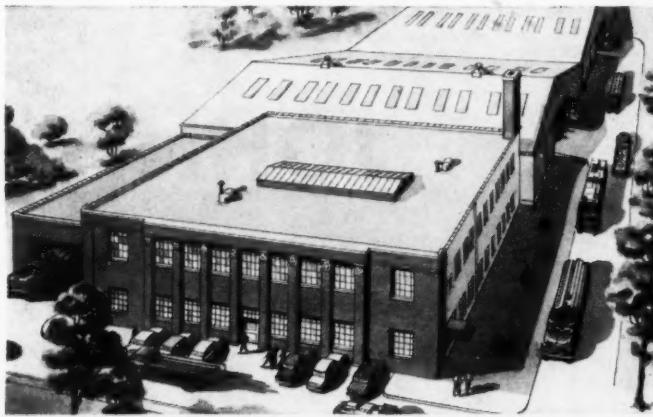
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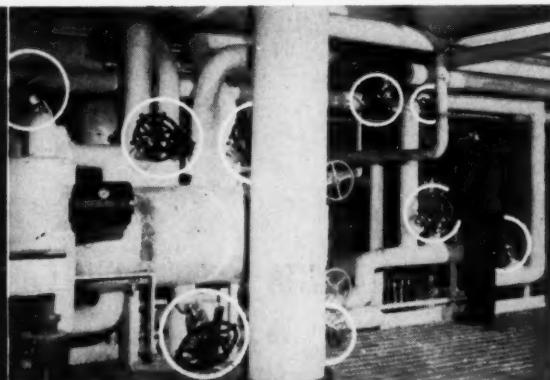
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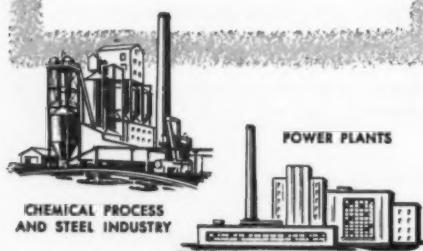
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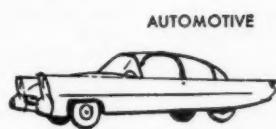
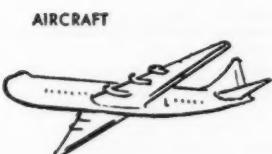
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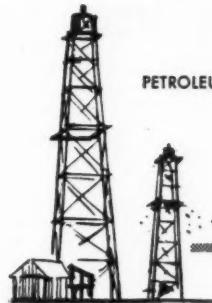
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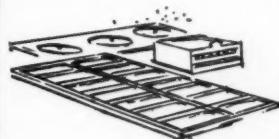
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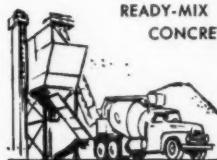
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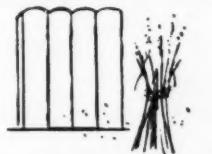


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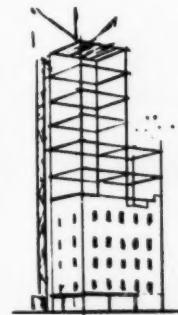
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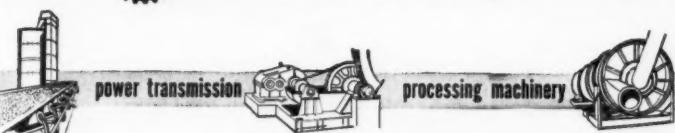
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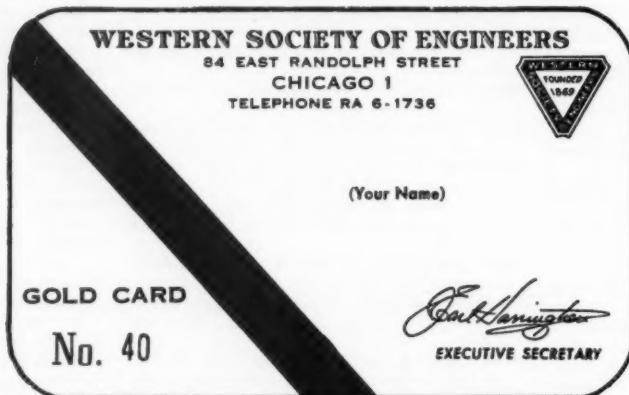

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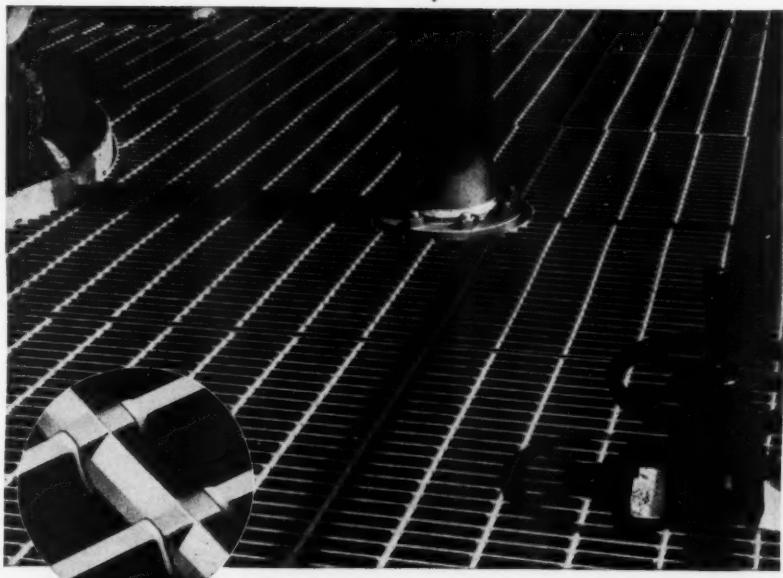
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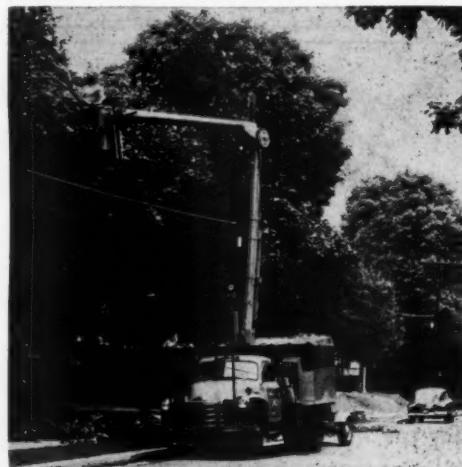
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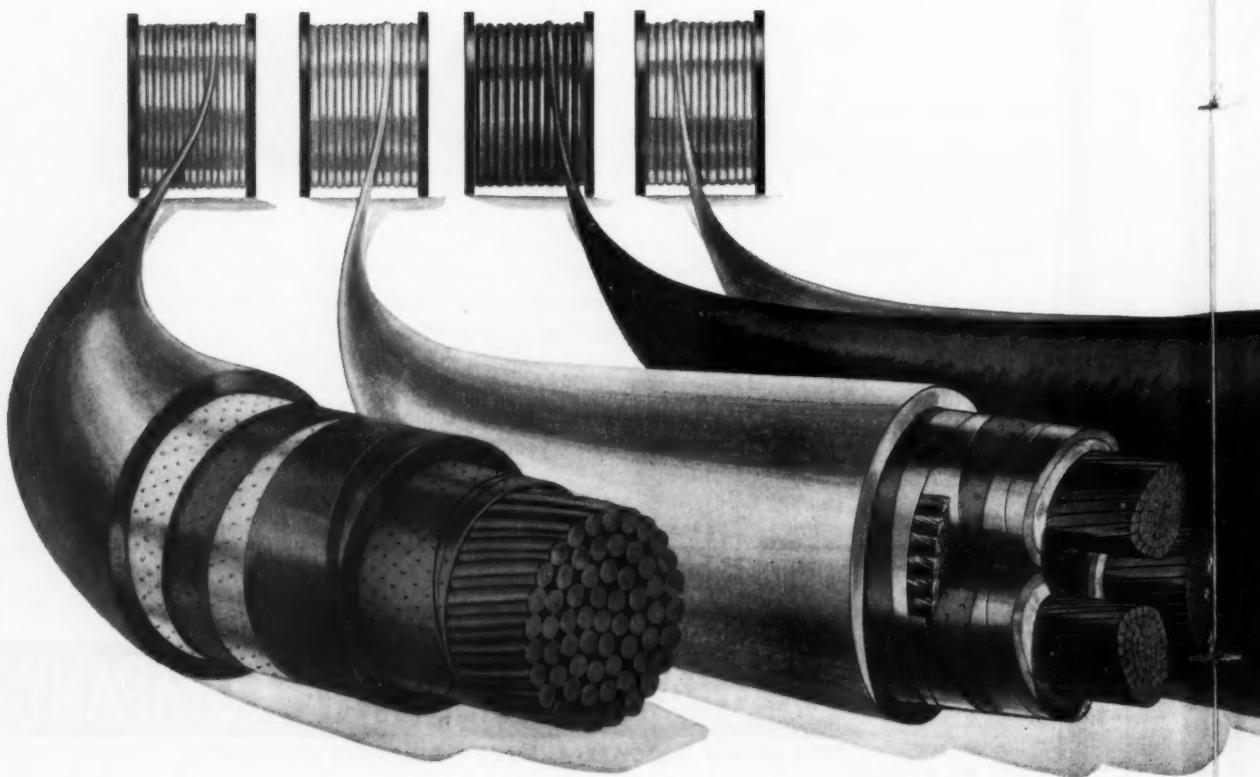
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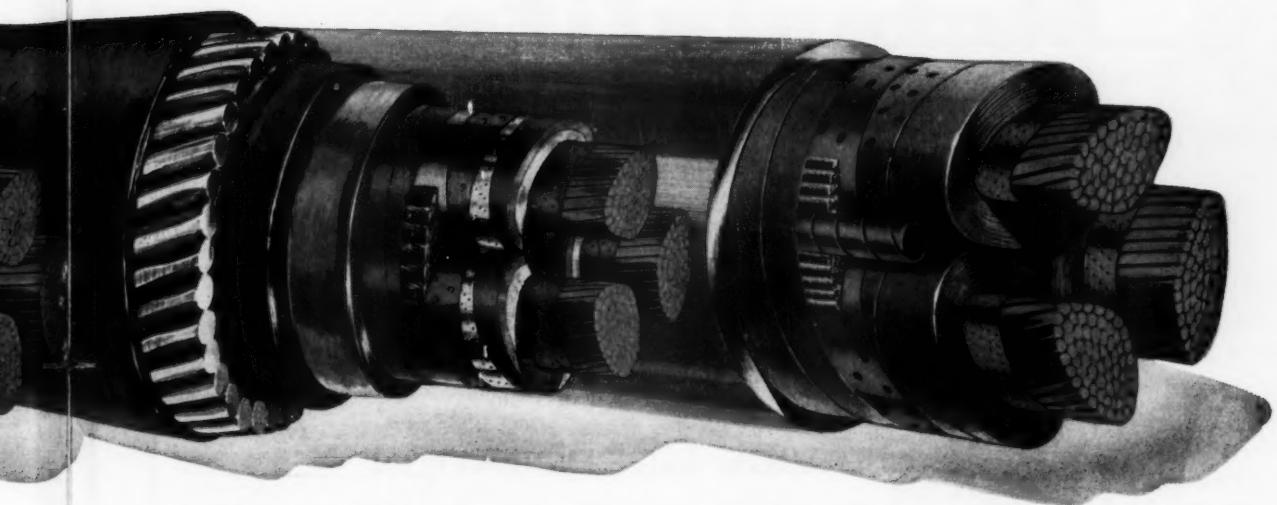
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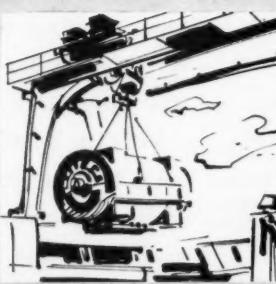
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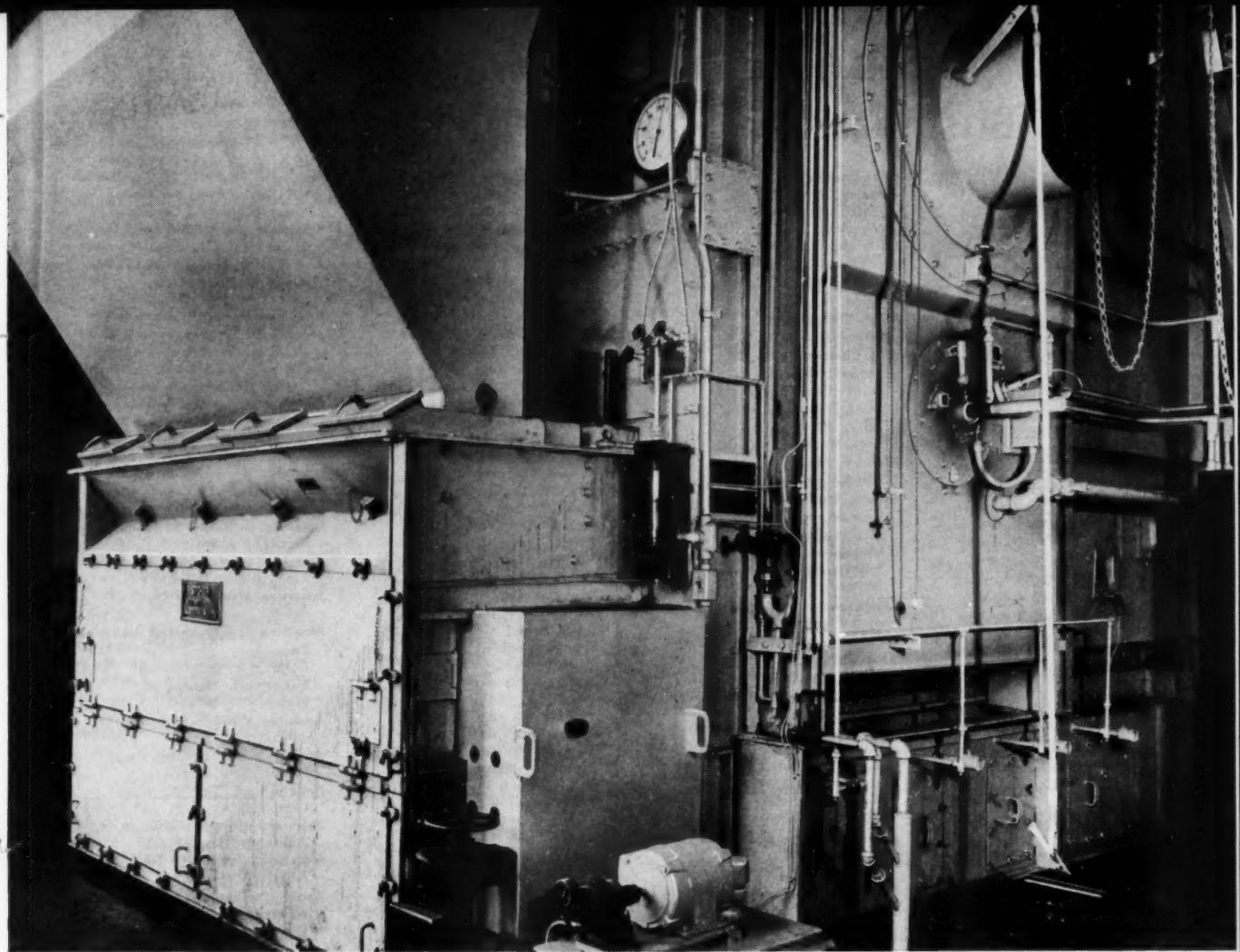
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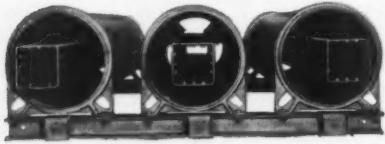
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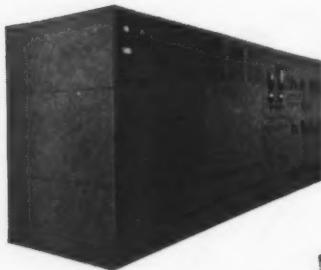
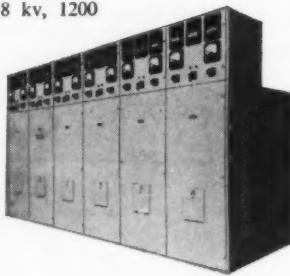
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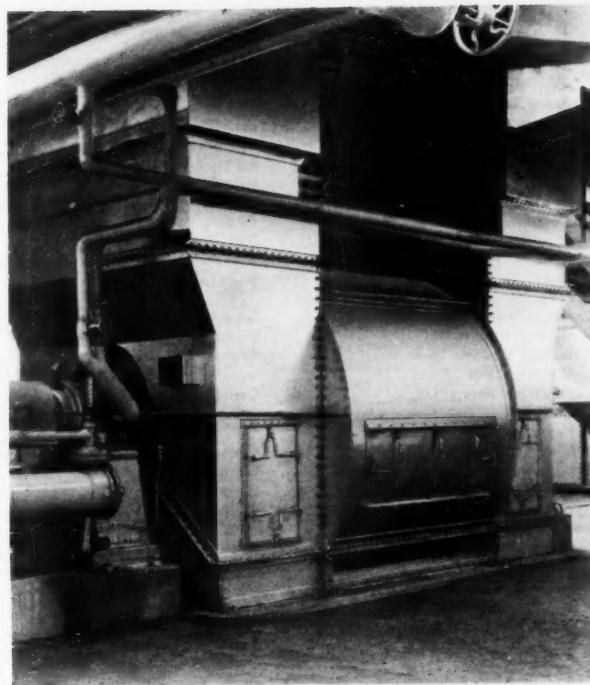
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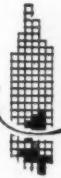
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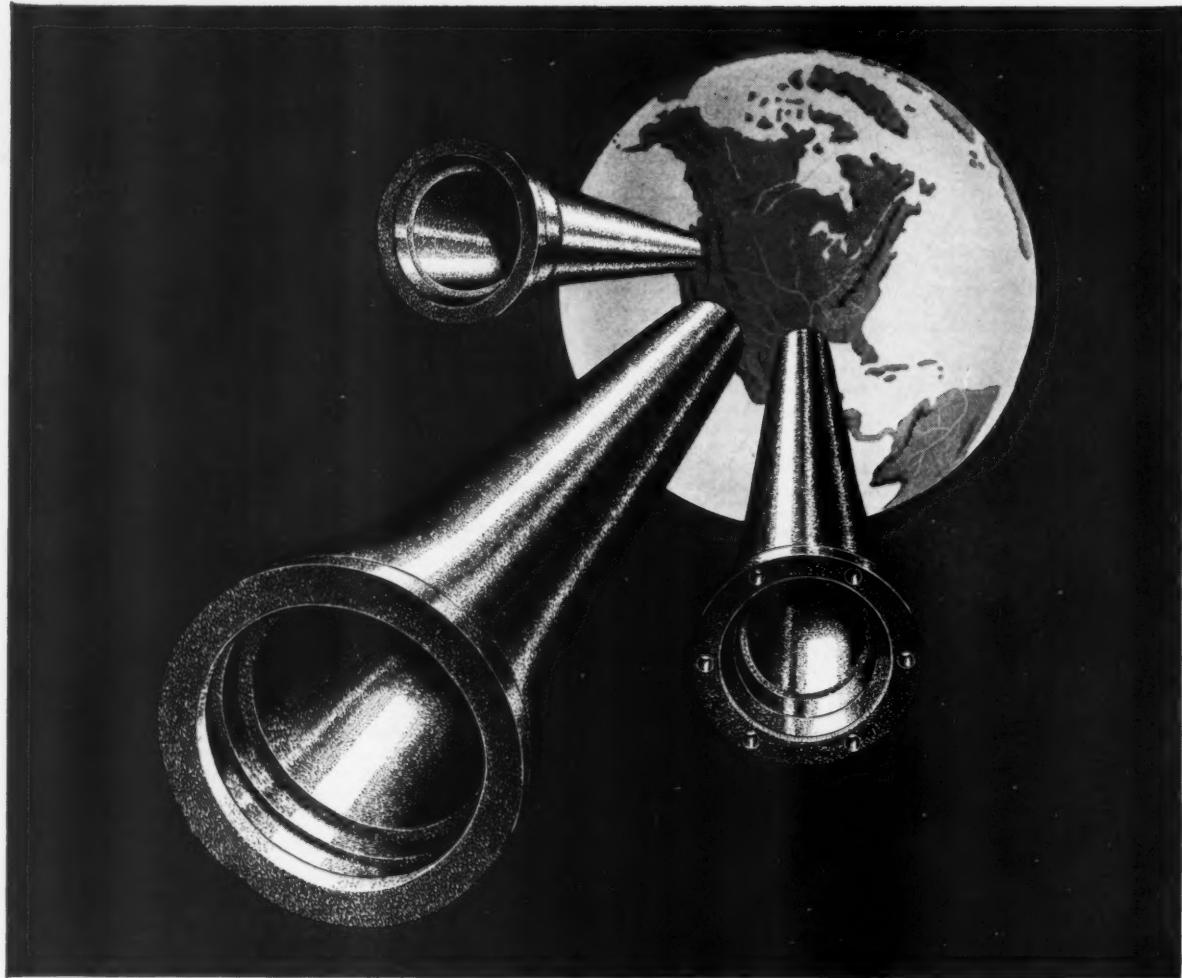
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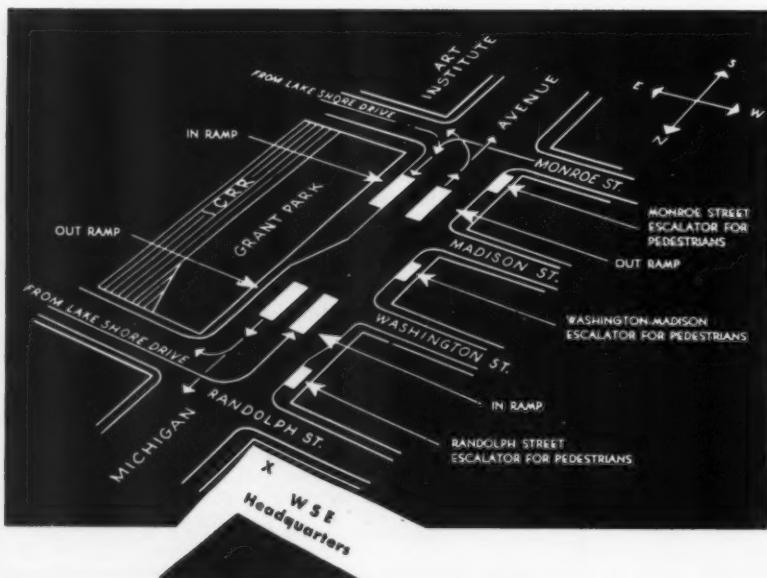
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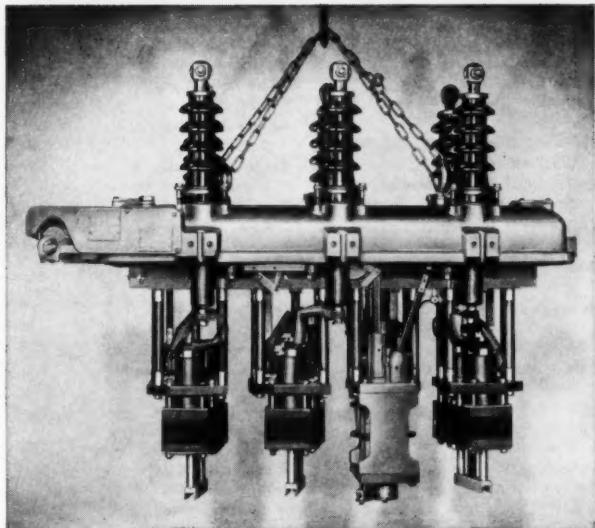
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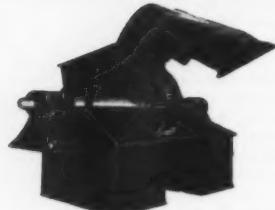
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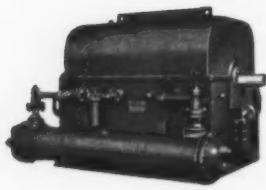


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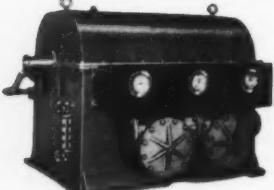


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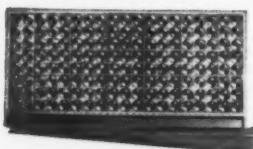


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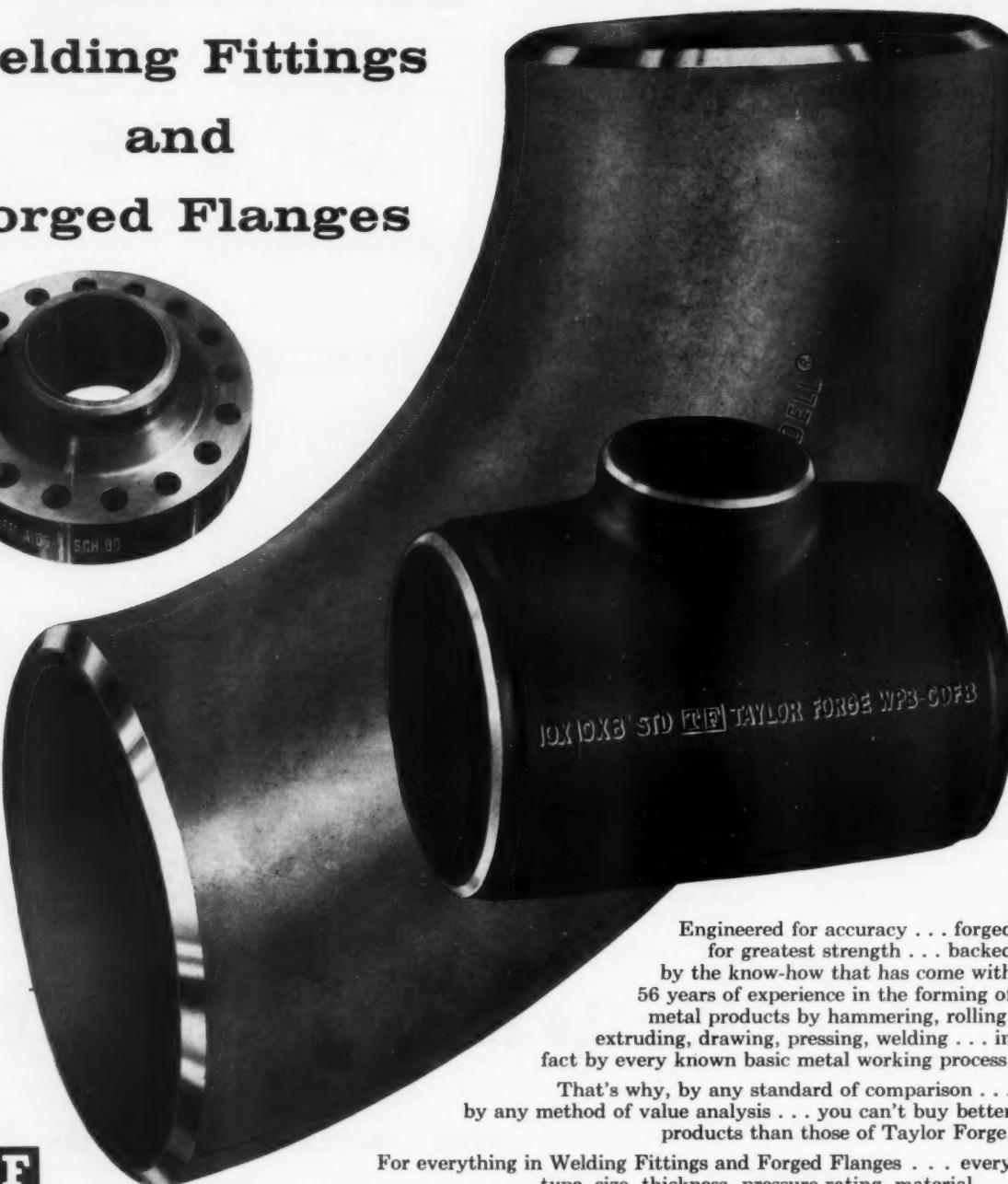
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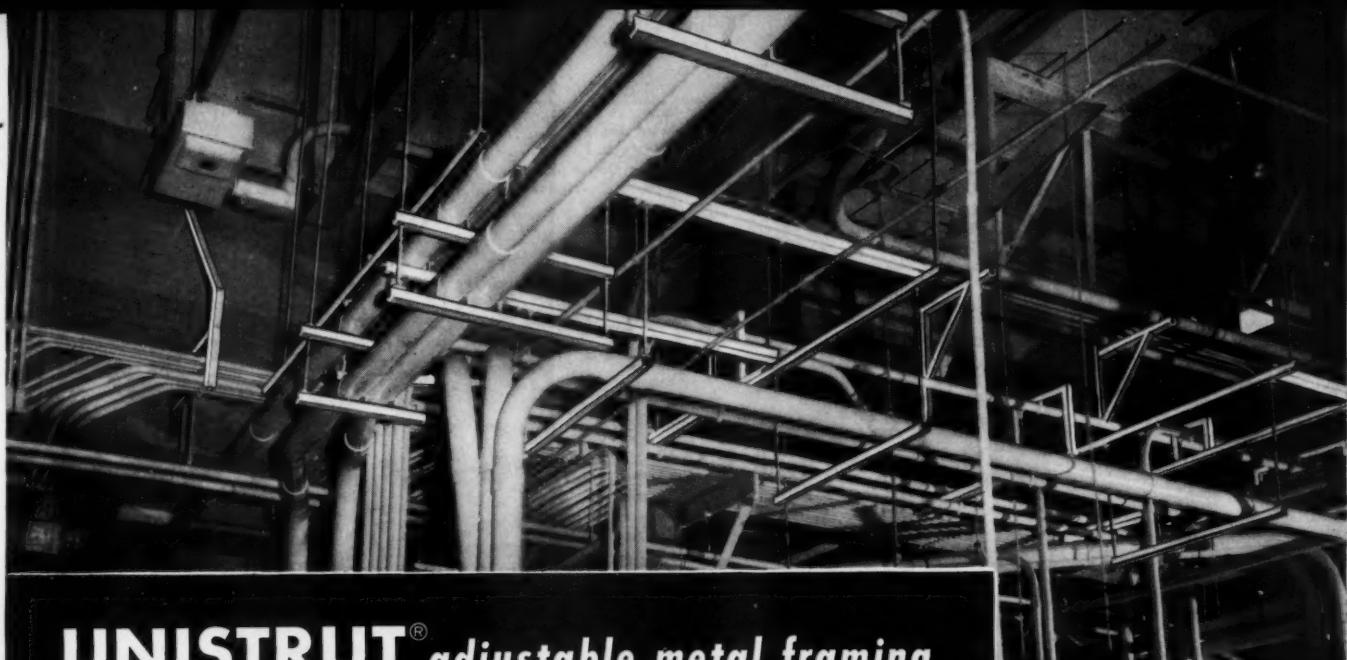
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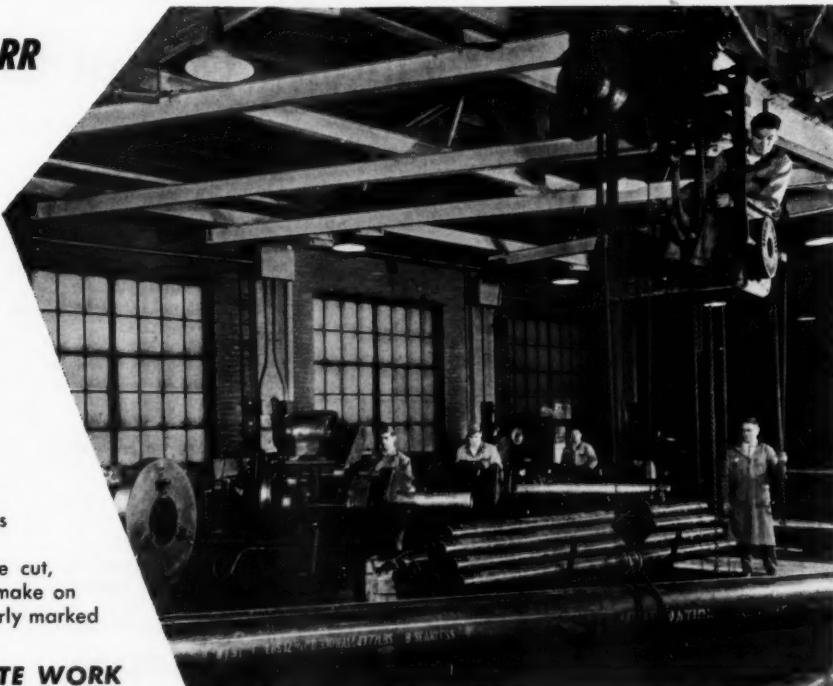
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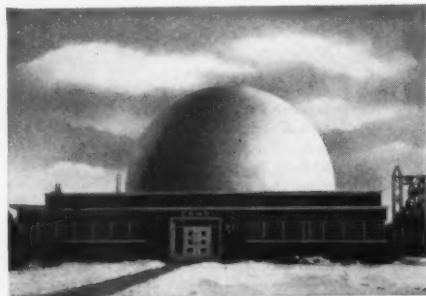
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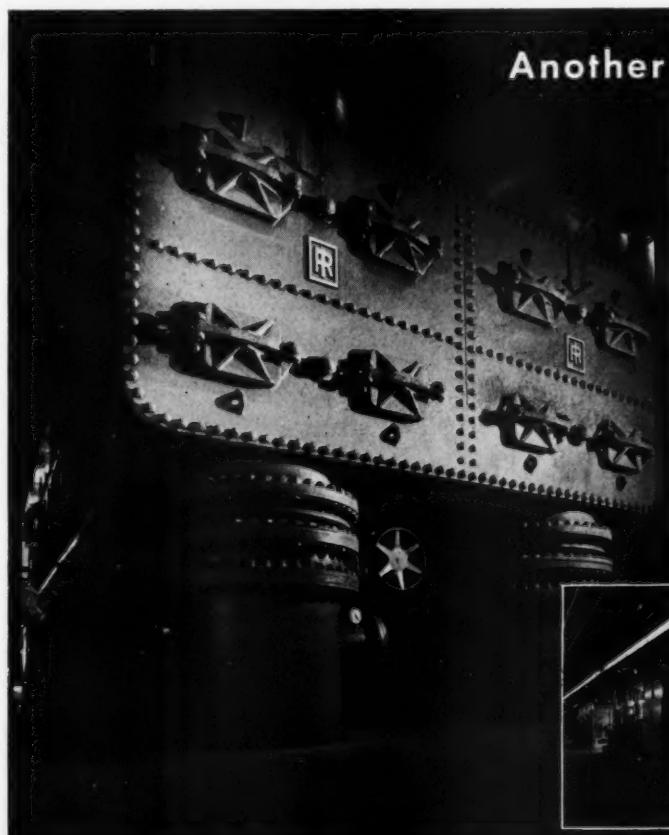


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Howson, L. R.	1937-38	1936-37	1935-36	1933-35			
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McClurg, V. O.	1948-49	1947-48	1946-47			1942-45	
McCullough, Ernest		1915-16	1914-15			1911-14	
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Seymour, W. O.			1891-92				
Shailer, Robert A.		1890-91					
Shankland, F. C.				1912-13			
Shapiro, B. B.				1921-22			
Skog, Ludwig						1949-52	
Smith, Frank V.						1956-	
Smith, Homer K.						1945-48	
Smith, Ormas G.	1957-58	1956-57	1955-56			1954-55	
Smith, W. Sooy	1877-80					1883-86	

Names of deceased Members are printed in light face type.

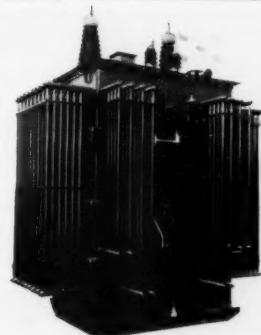
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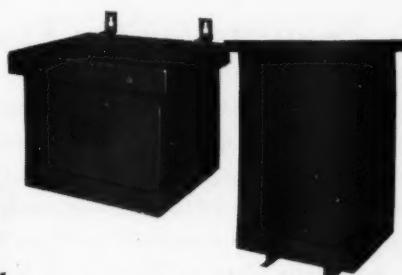
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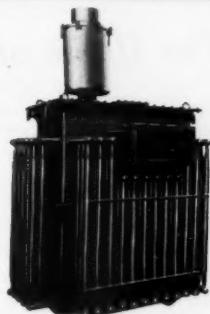
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Snow, T. W.						1904-07	
Steger, Donald V.						1947-49	
Strasser, R. J.						1937-40	
Strobel, C. L.						1892-95	
Sullivan, John F., Jr.	1954-55	1953-54	1952-53		1950-52		
Sykes, Wilfred						1948-51	
Talbot, A. N.				1907-08			
Townsend, H. C.						1943-46	
Turneaure, F. E.			1903-04				
Turner, Ralph E.						1945-48	
Van Gorp, Dick						1954-57	
VanPelt, J. R.	1936-37	1935-36				1934-35	
Vore, M. P., Jr.					1948		
Wallace, John F.	1896-97	1891-92					
Warder, J. H.							1901-15
Webb, C. Earl	1943-44	1942-43	1941-42			1940-41	
Westburg, Paul A.	1938-39	1937-38	1936-37	1935-36	1932-34		
Weston, C. V.						1929-32	
Weston, John W.		1888-89			1890-93		1889-94
White, Linn				1920-21			
Whiting, F. T.						1948-51	
Whitney, Nelson O.		1899-00					
Whitridge, John C.					1902		
Whittemore, D. J.			1886-87				
Whittier, C. C.	1934-35	1933-34	1932-33	1930-32		1927-30	
Williams Benetze	1885-86					1878-80*	
Wisner, G. M.						1905-08	
Witt, J. C.			1949-50				

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Wright, Augustine W.	1886-87		1884-85			1885-86	
Young, Hugh E.						1941-44	
Ziesing, August						1899-02	

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*Executive Committee preceded Trustees.

DECEASED HONORARY MEMBERS

Name	Date Elected	Onward Bates	3-22-22	C. F. Loweth	4-28-31
L. P. Moorhouse	12- 7-87	Robert W. Hunt	3-22-22	John F. Stevens	10-29-35
Octave Chanute	1- 5-09	Samuel Insull	6- 2-26	Benjamin F. Affleck	9-26-38
Grenville M. Dodge	5-20-09	Ralph Modjeski	6- 2-26	George Terry Horton	1- 7-44
D. J. Whittemore	12- 6-10	Bion J. Arnold	6- 1-27	Daniel Webster Mead	1- 7-44
Geo. W. Goethals	1-22-15	Arthur N. Talbot	6- 1-27	William S. Monroe	4- 4-46
John E. Blunt	1-10-17	E. C. Carter	6- 5-29	Burdick, Chas. B.	4- 4-46
Alonzo W. Paige	1-10-17	William Lamont Abbott	4-28-31	Condon, T. L.	3-26-45
D'Espoto, Joshua	11-26-19	John W. Alvord	4-28-31	Hecht, J. L.	5- 3-47

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Schless, J. T. ('20,LM), 1955
 Conrad, Nicholas J. ('20,LM), 1956
 Soderstrom, V. A. ('53,M), 1956
 Ripley, Herbert S. ('19,LM), 3-15-56
 Park, W. M. ('18,LM), 9-1-54
 Abramson, Ernest L. ('51,M), 11-9-56
 Garey, Daniel E. ('54,M), 1-27-57
 Arn, W. G. ('19,LM), 5-8-57
 Hazard, W. A. ('03,LM), 5-19-57
 Kientz, Glenn I. ('46,M), 5-27-57

Kneer, Vernon R. ('29,M), 5-31-57
 Howson, A. W. ('26,LM), 6-3-57
 Schweitzer, Arthur R. ('32,M), 6-12-57
 Boyer, Quinn O. ('24,M), 6-14-57
 Herz, Alfred ('19,LM), 6-14-57
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 Wennerholm, F. I. ('53,M), 9-23-57

Purcell, Theodore V. ('28,M), 10-6-57
 Schroeder, Bernard A. ('33,M), 10-22-57
 Grove, Charles G. ('54,M), 11-18-57
 Duffy, James F. ('43,M), 12-18-57
 Masters, Frank H. ('12,LM), 2-7-58
 Eshbach, Ovid W. ('41,M), 3-4-58
 Jacobson, John A. ('55,A), 3-12-58
 Phillips, Thurman A. ('27,LM), 4-13-58

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E. S. Chesbrough	6- 9-73 to 6-19-77	Onward Bates	1- 3-99 to 1- 2-00	H. J. Burt	1-10-17 to 1- 9-18
Wm. Socy Smith	6-19-77 to 8- 3-80	Ambrose V. Powell	1- 2-00 to 1- 8-01	Chas. B. Burdick	1- 9-18 to 1-22-19
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Willard S. Pope	1- 2-82 to 1- 8-83	William H. Finley	1- 7-02 to 1- 6-03	F. K. Copeland	1-28-20 to 6- 1-21
DeWitt C. Cregier	1- 9-83 to 1- 6-85	Ralph Modjeski	1- 6-03 to 1- 5-04	C. H. MacDowell	6- 1-21 to 6- 7-22
Benezette Williams	1- 6-85 to 1- 5-86	H. W. Parkhurst	1- 5-04 to 1- 3-05	J. L. Hecht	6- 7-22 to 6- 6-23
A. W. Wright	1- 5-86 to 1- 4-87	Edward C. Carter	1- 3-05 to 1- 2-06	C. A. Morse	6- 6-23 to 6- 4-24
S. G. Artingstall	1- 4-87 to 1- 3-88	Bion J. Arnold	1- 2-06 to 1- 8-07	E. T. Howson	6- 4-24 to 6- 3-25
A. Gottlieb	1- 3-88 to 1- 8-89	W. L. Abbott	1- 7-08 to 1- 5-09	Homer E. Niess	6- 3-25 to 6- 2-26
E. L. Corthell	1- 8-89 to 1- 8-90	C. F. Loweth	1- 7-08 to 1- 5-09	F. E. Morrow	6- 2-26 to 6- 1-27
L. E. Cooley	1- 8-90 to 2- 3-92	Andrews Allen	1- 5-09 to 1-12-10	Rufus W. Putnam	6- 1-27 to 6- 6-28
Isham Randolph	2- 8-92 to 1- 4-93	J. W. Alvord	1-12-10 to 1-11-11	John A. Garcia	6- 6-28 to 6- 5-29
Robert W. Hunt	1- 4-93 to 1- 3-94	O. P. Chamberlain	1-11-11 to 1-10-12	William S. Monroe	6- 5-29 to 6- 1-30
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Horace E. Horton	1- 2-95 to 1- 2-96	Albert Reichmann	1- 8-13 to 1- 7-14	Frank D. Chase	6- 1-31 to 6- 1-32

D. J. Brumley.....	6- 1-32 to 6- 1-33	F. H. Lane.....	6- 1-41 to 6- 1-42	H. P. Sedwick.....	6- 1-50 to 6- 1-51
Harry B. Gear.....	6- 1-33 to 8- 1-34	Fred G. Gordon.....	6- 1-42 to 6- 1-43	Donald N. Becker.....	6- 1-51 to 6- 1-52
Charles C. Whittier.....	8- 1-34 to 8- 1-35	C. Earl Webb.....	6- 1-43 to 6- 1-44	Ovid W. Eshbach.....	6- 1-52 to 6- 1-53
Frank F. Fowle.....	8- 1-35 to 8- 1-36	Philip R. Elfstrom.....	6- 1-44 to 6- 1-45	Charles E. Deleuw.....	6- 1-53 to 6- 1-54
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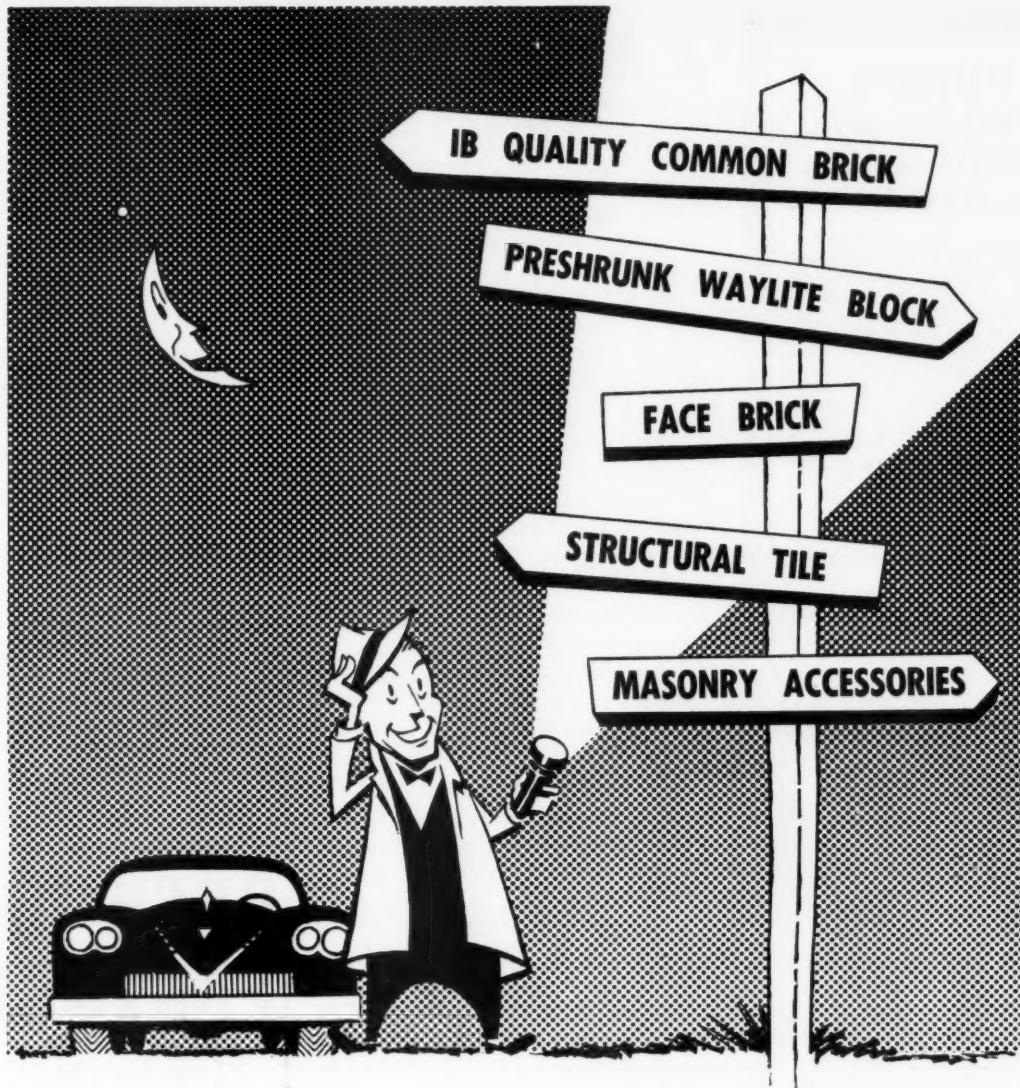
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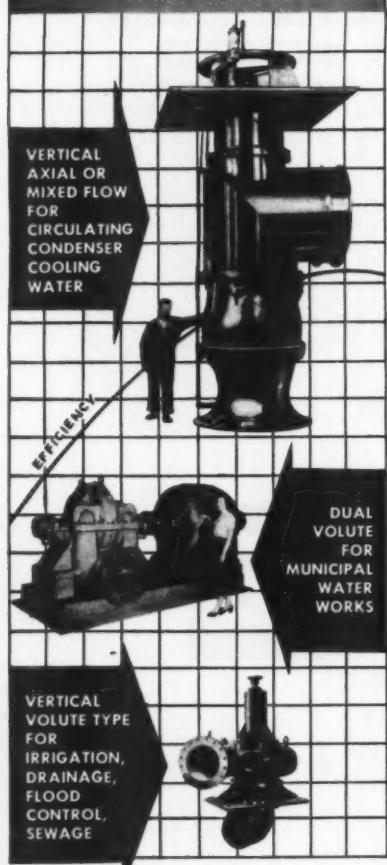
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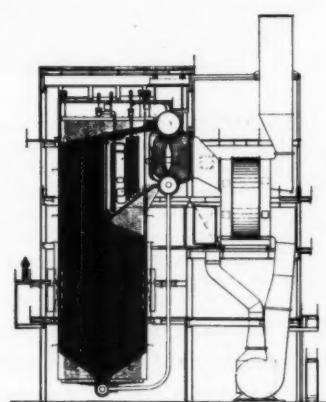
The boilers illustrated here cover the broad capacity range from 4,000 to 600,000 lb of steam per hr. They are all especially designed for gas and/or oil firing. The two units illustrated at right (Types VP and VU-55) are standardized and each is available in several sizes. The capacity range covered by these two units is from 4,000 to 120,000 lb per hr. The two units below are custom designed for various capacity, pressure and temperature requirements up to 600,000 lb per hr, 1400 psi and 950 F. All these units are pressure fired and do not require induced draft fans.

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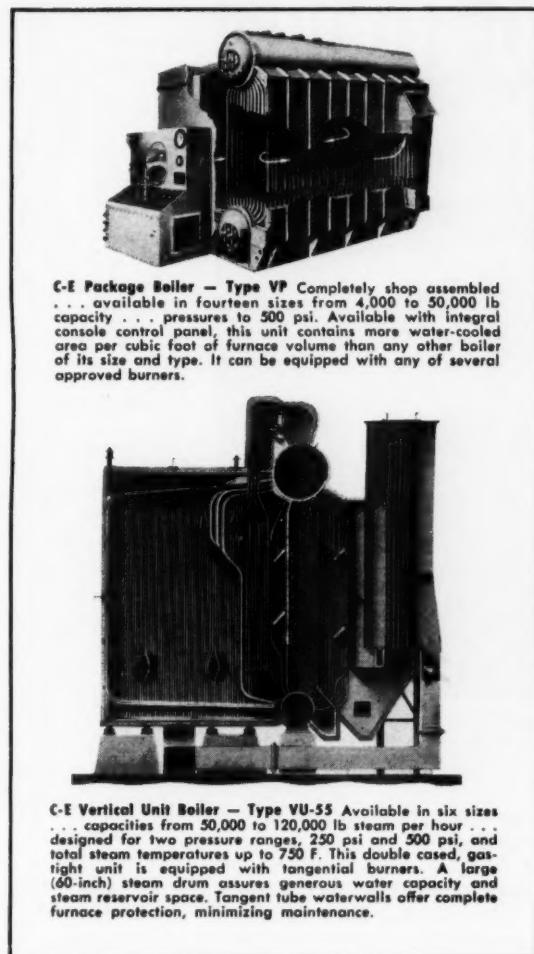
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B-922-A

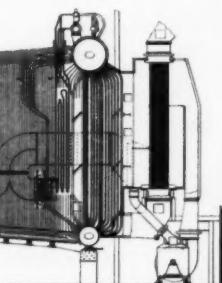


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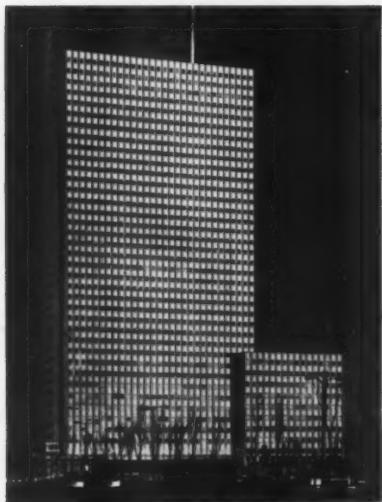
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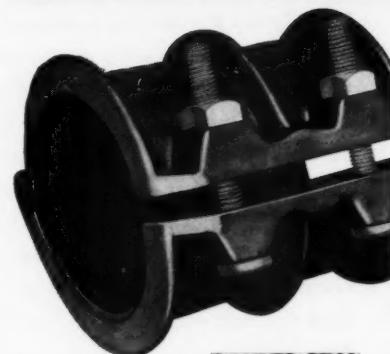
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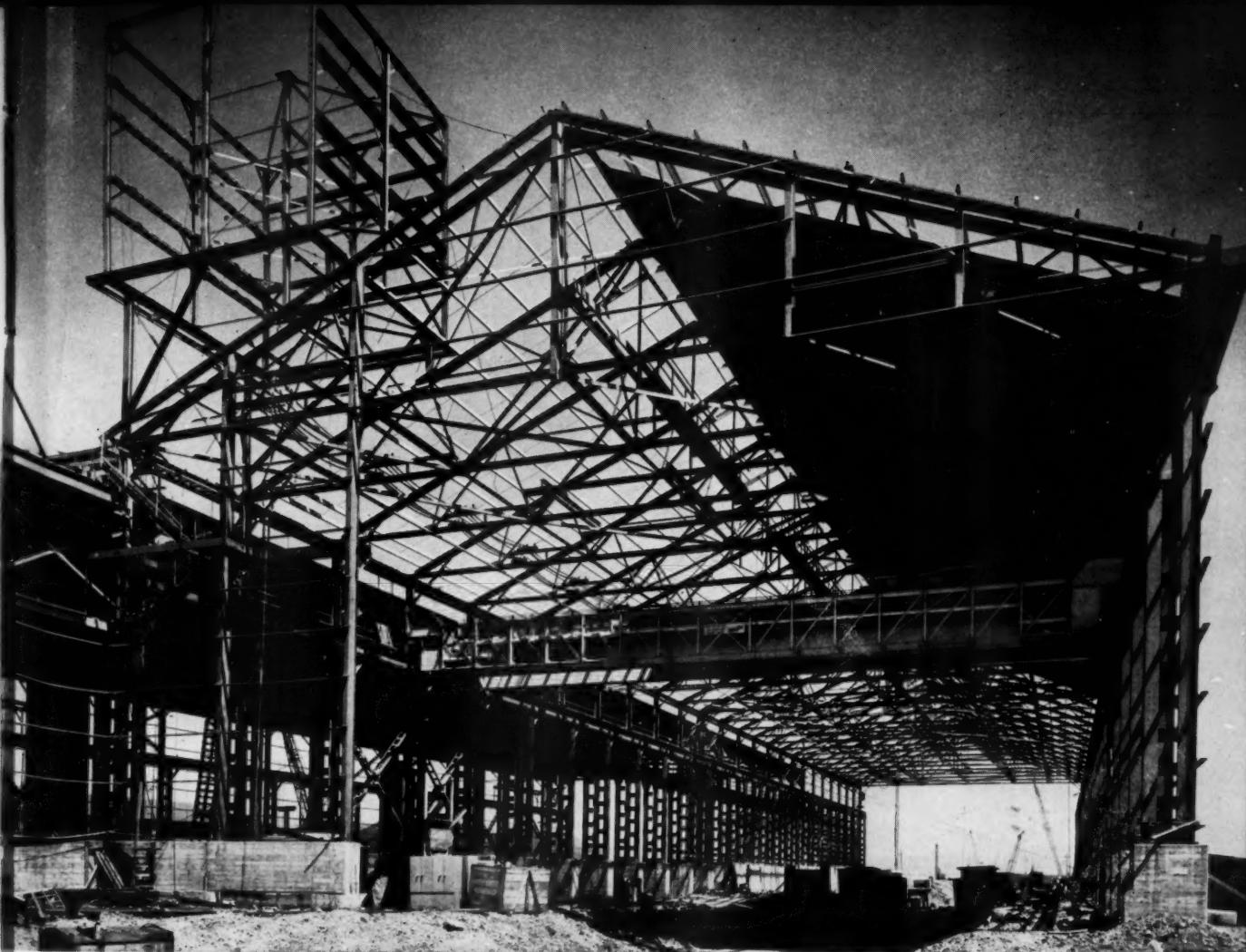
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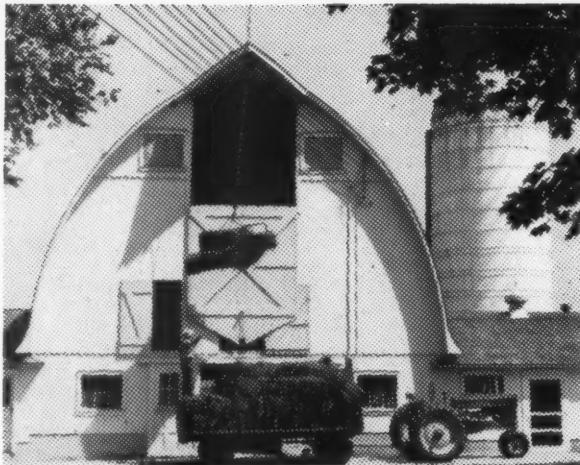
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NEW PLANTS, NEW INDUSTRIES. Power demands rise as hundreds of new factories go up.



NEW OFFICE BUILDINGS, plus air-conditioning of other buildings, create record power demands.



THOUSANDS OF NEW HOMES, plus growing appliance load in existing homes, mean more horsepower needed.

Dynamic growth of Northern Illinois dictates huge expansion program

Generating capacity under construction in 1958 to equal capacity in service in 1929

Commonwealth Edison engineers have some sizable jobs cut out for them in 1958. For example: 1,605,000 kilowatts of new generating capacity will be in various stages of design and construction. This increase is equal to the total generating capacity of the Company in 1929.

Of the increased generating capacity, 815,000 kilowatts are scheduled for service this year, bringing Edison's total to over 4,800,000 kilowatts.

To make the additional power available to customers will require many miles of new transmission lines and many new substations, reinforcement of the distribution system.

This increase in generating, transmission, substation, and distribution facilities is necessary to meet the demands of thousands of customers each year, as well as the ever-increasing demands of existing customers.

The cost of providing these additional facilities is reflected in Commonwealth Edison's current four-year \$600,000,000 construction program which \$170,000,000 will be spent this year. Measured by any standard, 1958 will be a busy year for Commonwealth Edison.

As a good citizen and a good neighbor, Edison continues to fulfill its obligation to provide dependable electric power essential to the continued growth of Northern Illinois.



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Public Service Company

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